12-9-1971

Project "Foresight": First Phase

Unknown

PROJECT "FORESIGHT"

FIRST PHASE

December 9, 1971

TABLE OF CONTENTS

PROJECT "FORESIGHT"

An oft-heard expression is, "we've got bookshelves full of plans, and what we need is implementation." The truth of the matter is that there probably are warehouses full of plans and studies. Almost all the plans and studies, though, have been developed within a very narrow focus to solve one problem and don't consider problem or program interrelationships. If the plans and studies were implemented, they would probably cause more problems than they would solve.

Almost two years ago, mayors, county commissioners, city managers, and planners met with the Governor and state agency administrators to discuss the need for a Willamette Valley plan. The primary question posed was, "How can we local governments at the regional as well as at the city and county level plan until we have some knowledge of what the state and Federal agencies are doing?" This same question has been posed on the Oregon coast, as well as in other cities and counties throughout the state.

Past efforts at developing comprehensive planning at the state level have provided some perspective, but for the most part, these attempts have not addressed the question of developing an integrated on-going process to assist decision-makers.

Needed: Horizontal and Vertical Integration and Coordination

In the Willamette Valley there are 869 units of local government (cities, counties, school districts, and other special districts), about 150 state agencies, boards, and commissions, and about 150 Federal agencies, boards, and commissions, all of which have powers, duties, regulations, responsibilities, and policies that affect the Willamette Valley. The key question that comes up is, "How do you get all of these agencies working together? How do you overcome the problem of the left hand not knowing what the right hand is doing?"

The Willamette Valley Environmental Protection Plan and a Process

Project "Foresight" at this time is concentrating on two major objectives: (1) the development of the first phase of a Willamette Valley Environmental Protection Plan, and (2) refine and sustain a process for resolving intergovernmental, interregional, and interagency conflicts.

The primary responsibility of accomplishing this task has been given to the Executive Department's Local Government Relations Division. Three intergovernmental task forces have been formed, for Economic Policy, Transportation, and Natural Resources; and state, local government, and Federal personnel are members. Task

force leadership is being provided by the State Department of Transportation, Assistant to the Governor for Economic Development Office, and the Assistant to the Governor for Natural Resources Office.

The Willamette Valley as the Experiment

While a plan and a process are needed for the entire state, the environmental planning process had to start somewhere. The Willamette Valley, with 1.5 million people and with most of the state's problems, seemed the logical starting point. Other areas of the state also need the integrated environmental planning process.

Project "Foresight" Steering Committee

Project "Foresight" is being supervised by a steering committee composed of the Governor and six state agency heads, eight elected officials from local government, two legislators, and three commission leaders.

A New Thrust

The steering committee in September determined that what was needed was a new approach to planning. At that time, the committee approved a three-month work program that established benchmarks composed of projected population, employment, and natural resources factors for the years 1980 and 2000. The benchmarks have been utilized to demonstrate the effects of the state, local, and Federal economic, natural resources, and transportation programs as they relate to the Willamette Valley in those years. The product in essence is a preliminary projection of present activities.

The second phase of the program in meeting the two objectives of Project "Foresight" will attempt to further identify the probable futures for the Willamette Valley, develop a tool to promote a better understanding of social problems and their interrelationship, and determine the kind of information that is most useful to decision-makers.

PROJECT "FORESIGHT"

FIRST PHASE WORK ACTIVITIES

September 1 - December 1, 1971

"A Report to the Steering Committee"

At the August 1971 meeting of the Steering Committee, a work program was presented and approved for Project "Foresight" covering the three-month period of September 1 to December 1. This work program contained specific research and analysis activities for each of the three task forces organized to date -- Natural Resources, Economic Policies, and Transportation.

The purpose of the three-month first phase was two-fold: First, by using given "benchmark" projections of population* and employment levels, develop an inventory and analysis of major environmental, economic, and transportation programs and problems, and develop a preliminary forecast; and secondly, consolidate this information by task force into preliminary "overviews" of the Willamette Valley.

The method utilized for accomplishing these tasks was the assignment to each of the three task forces the responsibility for data gathering, analysis, and preparation of the attached written reports. Without active task force participation and interest in this project, this report would not have been possible.

During this three-month period, each task force was composed of professionals from state agencies, Councils of Governments, and local governments. Task force membership now totals near 50.

Each task force determined that, due to the enormous volume, the management and analysis of data was a major problem. There was an assist within the Highway portion of the Transportation task force, where a computer application existed. These problems played a major role in limiting the number of factors each task force could effectively evaluate.

The following reports are organized to reflect the functional area of the three task forces. The projections of factors such as consumption and quality of natural resources, use and needs for transportation facilities, and projections of population and economic indicators are all "straight line" projections into the future. For example, certain mileages and types of highways are projected based on needs. In several years, this projection based on need might be modified by such external forces as intolerable levels of air pollution, reduction of federal financial support, or increasing conflicts between environment and highway advocates.

Future technological changes have not been included in the projections.

*1980, 1,733,000; 2000, 2,512,000.

ECONOMIC POLICY

INTRODUCTION

Recognition and concern over environmental development is leading to this evaluation of the Willamette Valley by this Intergovernmental Task Force. It is apparent from the data collected to date that there is little available knowledge of the environmental impact of economic programs and the economic impact of environmental programs. Decision-makers must understand the relationship between economic growth and environmental quality in order to maintain economic viability while preserving the rapidly deteriorating natural environment. The economic personnel involved in this Economic Task Force study share these concerns and hope in the future to better understand these relationships and be privileged to follow on with additional assignments that will assist in developing alternative economic programs.

A paradox has emerged, for Valley growth is directly related to the environmental quality and natural resources found in the Valley. However, rapid growth threatens the very resources that have stimulated economic and demographic expansion. It would seem that there is a dual economic structure. The urban areas of the Willamette Valley are rapidly expanding, both economically and in population, while rural areas of the Valley have identifiable depressed areas and some outmigration is evident. This, of course, means that the State of Oregon, and specifically the Valley, must actively pursue economic development programs. Total disregard or discouragement of economic growth should not occur as long as there are these depressed areas. Conversely, we must be aware in the Valley of the impact of development programs on the state's economy, but must not lose sight of the fact that the nature and quality of its environment is its greatest asset and must be preserved. Economic programs need not be at odds with environmental and ecological considerations. It has been clearly shown that the preservation and improvement of the environmental quality of the Valley can increase the development potential of this area and is a major factor in explaining its past growth.

The report that follows is a preliminary attempt at cataloging some of the important economic indicators within the Willamette Valley. Being a preliminary attempt, it is concerned primarily with population and employment. In the future, additional economic indicators will not only be added to the data that has been collected, but present data and future data will be continually refined so that we can begin to define the environmental impact of economic programs and the economic impact of environmental programs.

I. PRESENT STATUS

A. Population

The 1970 Willamette Valley area population was 1,475,384.(1) From 1940 to 1970 there has been a 109.3% increase in the population within the Valley. In the rest of the state the percentage of increase only amounted to 61.8%. It would appear that as population increases in the State of Oregon, three out of every four persons will probably settle within the Valley.

The Lower Area of the Willamette Valley (Columbia, Clackamas, Multnomah and Washington Counties) had a population in 1970 of 909,465, a percentage increase in population between 1940 and 1970 of 93.4%. This is less than the other three sections of the Willamette Valley.

The Middle Area of the Willamette Valley (Yamhill, Polk, Marion, Linn and Benton Counties) showed a population of 352,571 in 1970. The percent of increase since 1940 amounted to 106.6%.

In Sub-Area A of the Middle Valley Area (Yamhill, Polk and Marion Counties) the population in 1970 was 226,900 people, a percentage of increase since 1940 of 86.6%.

In Sub-Area B (Linn and Benton Counties) the 1970 population was 125,700. The percentage of increase since 1940 is 155.9%.

The Upper Valley, consisting of Lane County by itself, had a population in 1970 of 213,358. This was a percentage increase since 1940 of 208.8%. (See chart 1 , page 2-14)

B. Population Density

The population density within the Willamette Valley has increased from .08 persons per square mile in 1940 to .16 persons per square mile in 1970; an increase of 100%. The fastest growing area in density within the Willamette Valley is the Upper Area, Lane County. The percentage of increase since 1940 is 250%.

Closely following is the Lower Area (Columbia, Washington, Multnomah and Clackamas Counties). This area has increased between 1940 and 1970, 245.4% in density per acre.

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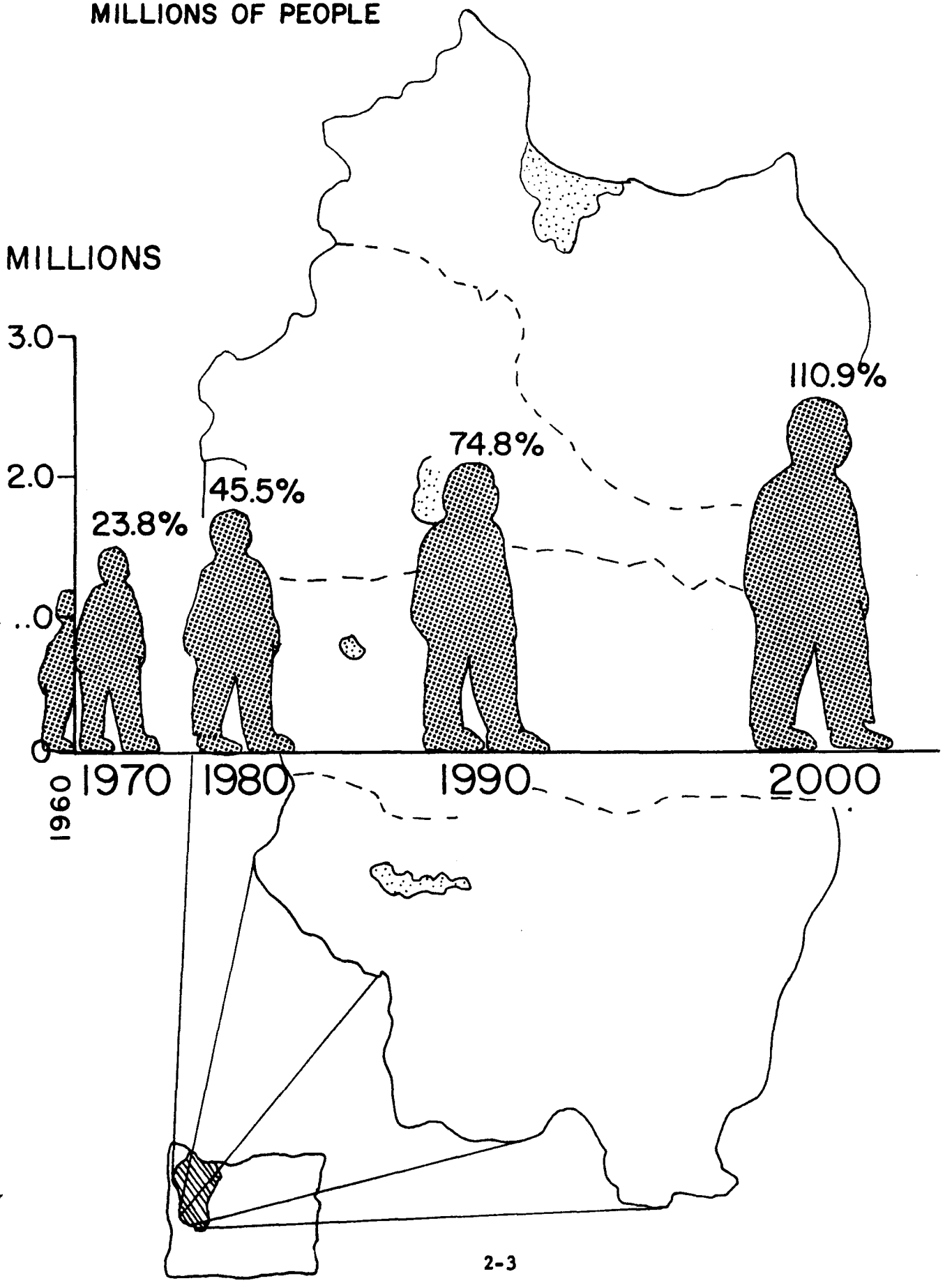
(1) U.S. Census.

WILLAMETTE VALLEY POPULATION 1960-2000



The Middle Area of the Willamette Valley, Sub-Area B (Linn and Benton Counties), has increased 200% since 1940, while Sub-Area A (Yamhill, Polk and Marion Counties) has only increased 85.7% during this same period of time. (See chart 4 , page 2-14)

C. Population Age Groupings

The 1970 Census indicates that the population of the Willamette Valley, compared to the state as a whole when separated into broad age groups, is as follows:

Age	% ±	Population ±
1-19	-.02	(1086)
20-34	+1.1	4508
35-44	-.01	(309)
45-54	-.01	(157)
55-64	-.05	(444)
65-74	-.01	(58)
+ 75	-.01	(42)
	Total	2412

(See chart 6 , page 2-16.)

D. Employment

Employment in the Willamette Valley has risen by approximately 165,000 jobs in the period between 1960 and 1969. This is a percentage increase of 35.8%. The Lower Area of the Valley (Columbia, Clackamas, Multnomah and Washington Counties) showed an increase of over 106,000, representing a percentage of increase of 35.1%. The Middle Area (Yamhill, Polk, Marion, Linn and Benton Counties) showed an increase of almost 35,000 jobs during the 1960-70 period for a percentage of increase of 35.2%. The Upper Area of the Valley (Lane County) showed an increase of 40.4%. This is the greatest increase for the entire Valley. (See chart 10 , page 2-19)

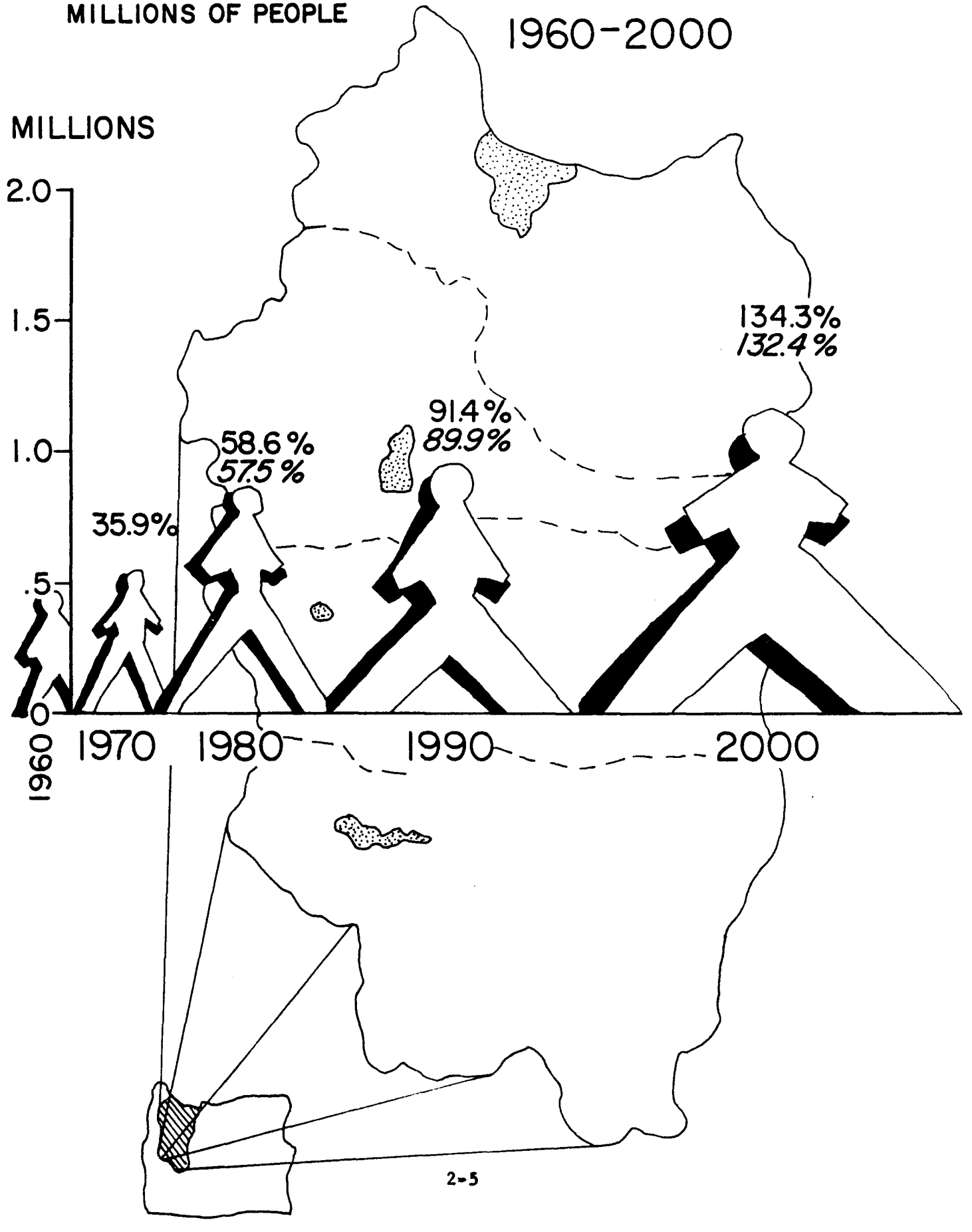
E. Employment by Oregon S.I.C. Codes

When total Valley employment is broken down into the Oregon Standard Industrial Classification codes, we find that as of 1969 the service sector has increased the greatest percentage, followed by finance, insurance and real estate; government; trade; manufacturing; construction; transportation, communications and public utilities; self-employed; and agriculture.

Agriculture showed a net loss in jobs since 1960 of over 5,000 jobs and a decrease in percentage of 15.5%.

WILLAMETTE VALLEY: CIVILIAN LABOR FORCE

EMPLOYMENT
1960-2000



The percentage of the Willamette Valley total employment, when broken down by the Oregon S.I.C. codes, shows the manufacturing sector in 1969 as having the largest percentage of employment followed by trade; government; services; self-employed; transportation, communications and public utilities; finance, insurance and real estate; agriculture; and construction.

The greatest percentage of increase of total Valley employment by Oregon S.I.C. codes from 1960 to 1969 is a 4% increase of total employment in services, followed by a 1.8% increase in government; a 1.2% increase in construction; a .08% increase in finance, insurance and real estate; a .07% increase in trade; and a .02% increase in manufacturing. There was a decrease in employment in relationship by sector to the total Valley employment in the self-employed sector of -3.0% and in agriculture of -2.8%. (See chart 11 , page 2-19)

F. Prime and Secondary Industries

Analysis of the prime and secondary industries within the Willamette Valley provides insight to the future employment requirements. Since growth of employment in the prime sector precedes increases in the secondary sector, the prime industries are evaluated first. (Our definition of prime industries includes: agriculture, forestry, mining, fishing and manufacturing. All produce some type of marketable goods.)

We will also relate to two other sectors of the economy which are of great importance to the Valley; these are tourism and foreign trade. The export of goods produced in the Valley, which provides incoming revenue generated outside the Valley or raw materials for the Valley industry, make exports an important consideration. Somewhat the same result is true with tourism dollars, which again provides a source of outside revenue.

In the Willamette Valley employment in prime industry sectors[2] grew from an estimated 130,779 persons in 1960 to 158,822 in 1969. Further, employment in prime industry is projected to gain an additional 80,503 persons in the next 30 years. This will be a 50.6% increase in employment from 1969. The prime industry sectors amounts to about 25.4% of the total employment of the Valley in 1969. This percentage seems to be gradually decreasing and is forecasted to approach 22.2% in the year 2000.[3]

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(2) S.I.C. Codes.

(3) Percentages taken from Employment and Population Projections to Year 2000, Columbia Region Association of Governments, 1968. Assuming they apply Valley-wide.

Secondary industries, often called ancillary by economists (construction, transportation, communications, utilities, trade, finance, insurance and real estate, services, self-employed and government), generally are growing in the percentage employed. In 1960, the percentage was 71.5%. It is estimated to increase to 77.7% by the year 2000 within the Valley.

Willamette Valley employment in these secondary industries has risen from 329,321 in 1960 to 466,358 in 1969 and is projected to rise to 838,713 by the year 2000. (See chart 14 , page 2-21) Since the growth possibilities of these industries relies heavily on the health of the prime industries, probably more planning attention and casual relationship concern should be directed there.

II. PROJECTIONS, YEARS 1980, 1990, 2000 ASSUMPTION -- BUSINESS AS USUAL

A. Population

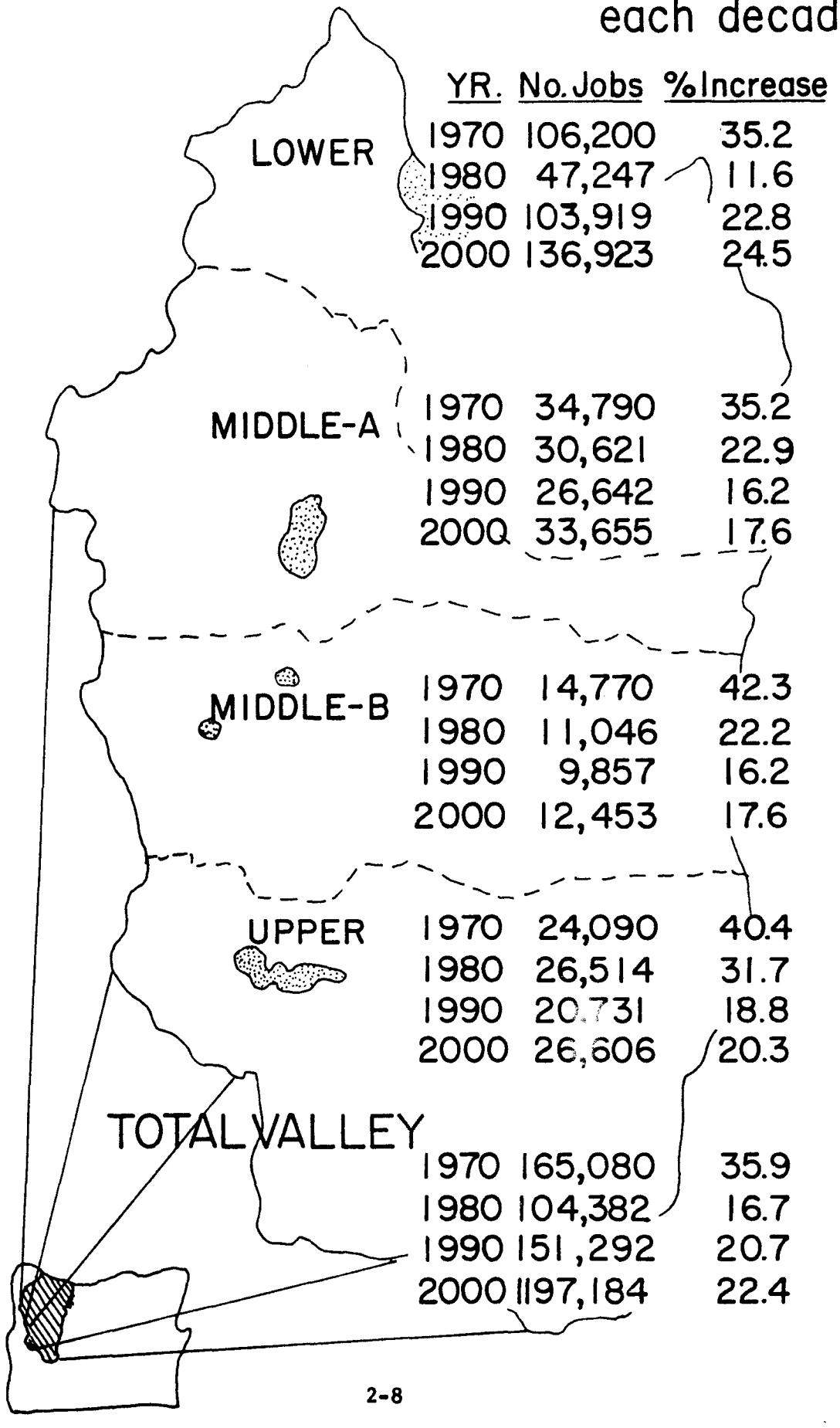
The population projections developed by the Executive Department for the Willamette Valley Environmental Protection Plan (See Appendix A) shows an increase in the Willamette Valley population by the year 2000 amount to 2,512,031 million people. This is a percentage increase of 70.2% from 1970. This will be distributed throughout the Valley as follows: In the Lower Area (Columbia, Clackamas, Multnomah and Washington Counties) there is expected to be over 1,500,000 people and 62.8% of the total population of the Valley. In the Middle Area (Yamhill, Polk, Marion, Linn and Benton Counties) there is expected to be over 500,000 people or 22.2% of the total. In the Sub-Area A (Yamhill, Polk and Marion Counties) there is expected to be over 350,000 people or 14.3% of the total. In Sub-Area B (Linn and Benton Counties) there is expected to be 374,000 people or 14.8% of the total population of the Valley.

B. Population Density

The population density per acre for the Willamette Valley is projected to increase from .17 persons per acre in 1970 to .28 by the year 2000; an increase of 100.0%. The fastest area in increasing density would be the upper area which shows an increase from .06 persons per acre to .13 by the year 2000; an increase of 116.6%. The next area of growth in density would be the lower area where the density of the people per acre rises from .32 to .67 from the year 1970 to the year 2000; representing 109.3% increase. The Middle Area of the Willamette Valley shows a 100.0% increase in density from 1970 to the year 2000; going from .08 persons per acre to .16.

WILLAMETTE VALLEY - TOTAL NEW JOBS

Projected new jobs by section and % increase each decade



YR.	No. Jobs	% Increase
LOWER		
1970	106,200	35.2
1980	47,247	11.6
1990	103,919	22.8
2000	136,923	24.5
MIDDLE-A		
1970	34,790	35.2
1980	30,621	22.9
1990	26,642	16.2
2000	33,655	17.6
MIDDLE-B		
1970	14,770	42.3
1980	11,046	22.2
1990	9,857	16.2
2000	12,453	17.6
UPPER		
1970	24,090	40.4
1980	26,514	31.7
1990	20,731	18.8
2000	26,606	20.3
TOTAL VALLEY		
1970	165,080	35.9
1980	104,382	16.7
1990	151,292	20.7
2000	197,184	22.4

C. Population Distributed by Age Groups

Population by age groups has been projected utilizing the same percentage of those age groupings by the total population as was presented in the 1970 U.S. Census. As can be seen on the charts 9 , page 2-18, the future population will be a younger people. It will be a mobile population with a p to change jobs frequently and move in and out of areas seeking a livelihood and, most probably, low rent and apartments and medium to low price housing.

There also will be an increasing number of senior citizens who will not increase as the percentage of the overall population, but will increase in numbers. The advances in medicine and other contributing factors to longevity, plus the ever increasing awareness of the Willamette Valley's mild climate, will cause the number of senior citizens to increase over the next 30 years.

D. Employment Projections

The economic growth of the Willamette Valley will depend a great deal on the expansion of existing industries. Since these projections have been based on a business as usual, straight line projection assumption, current information on the major sectors of the S.I.C. codes will govern the forecast made in these industrial areas.

The present day high unemployment rate should gradually lower and by the year 2000, most economists feel this rate will be below 5% of the total civilian labor force. This should be applicable to the Willamette Valley also. This Valley's economy, then, must generate over 450,000 jobs between 1970 and the year 2000.

E. Employment Projections in the S.I.C. Sectors

Following our assumptions, employment in the following sectors will probably develop roughly as follows: manufacturing 101,000; trade 113,000; finance, insurance and real estate 32,500; services 88,700; government 46,000; transportation, communications and public utilities 26,700; construction employment 28,700; self-employed 17,200; and agriculture -21,200. (See chart 12 , page 2-20)

These numbers, of course, are projections and should be regarded as such. Rather than looking at the exact figures, the indication that there will be an increase in total employment and that certain areas of the industrial sector will change is the important part of what is trying to be portrayed.

The Willamette Valley can look forward to expanded acreage of irrigated land. Pacific Power and Light's "The Pacific Northwest--Economic Growth in a Quality Environment, Volume II", states that 75,000 acres are planned for irrigation within the Willamette Valley. Added to this is the Federal reclamation projects which will cause additional substantial increases in acreage. The use of irrigation means better use of fertilizer, increased yields of high value crops -- all contributing to what should be a more optimistic agricultural economic outlook.

In the Valley, prime industries provide upward to 7% of the total employment, matching closely the forest products industry. While forest products are forecasted to maintain their percentage of the total employment in the future, the metals and machinery industries will gradually increase their total employment. Oregon, and more specifically the Willamette Valley, has demonstrated an increase in employment in primary metals of 196.1%.

F. Forecasts for Prime Industries

Metal, machinery, manufacturing, agriculture, and forest products make up the major segments of the prime industries -- mining and fishing are also in this category, although it is doubtful that they contribute sufficiently to concentrate any analysis on them at this time.

There has been an observable rise in the metal and machinery industries within the Valley. Pacific Power and Light compiled in their "The Pacific Northwest--Economic Growth in a Quality Environment, Volume II", much statistical data to support the assumption of continued growth within this industry. They maintain that the Pacific Northwest area, and the Willamette Valley particularly, has started from a small base serving some defense and local markets, forest and agricultural industries, and now comprise a highly technically oriented industry with complex and specialized products that are increasingly becoming competitive on the national and international markets.

Increasing use of marginal land through irrigation, close proximity of large food processing plants, new advances in food processing technology, and the decreasing cost of air transportation could lead to expansion in agriculture.

This possibility of more intensive agriculture through irrigation, coupled with increased mechanization, fertilizers, plus additional capital inputs, might stabilize the agricultural economy as the population in the Willamette Valley increases.

The gradual shift of population towards the western United States should lead to an increased share of national markets while at the same time developing a more competitive agricultural position. Prepared foods (of high dollar value) will increase their share of the food processing industry within the Valley. Food processing in itself is changing as the state-of-the-art modifies. These new processes (drying, freezing, etc.) gradually will take on more of the national and world markets because of their adaptability to transportation and distribution systems.

Therefore, with this shifting population and additional technological advances creating more demand for high value food products, the Willamette Valley agricultural economy can look to the future with expectations of a holding action on the erosion of its industry. Whether this erosion can be stopped before the majority of prime agricultural lands are transformed into other types of development are concerns that should come to the attention of todays decision-makers.

G. Secondary Industries

Growth in the secondary industries is lead by growth in the previously discussed primary industries. Secondary industries are many times identified as ancillary for service industries.

Secondary industries within the Willamette Valley are following the national and regional trends, increasing in employment more rapidly than prime industries.

Willamette Valley's secondary industries now accounts for approximately 75% of all employment, slightly higher than the regional or national percentage.

For this report, projecting "business as usual" we can assume an ever-increasing roll of secondary industries. Their overall share of total employment is expected to increase to over 77%. Leading the advance will be finance, insurance and real estate. These industries will be followed by construction and services; trade and government will make up the balance of increased employment.

Declines in employment can be expected in transportation, communications, public utilities and in the self-employed. While they give up their ranking as a percentage of the total, these industries are expected to employ an additional 26,719 people by the year 2000.

1. Construction

The slowdown in homebuilding during the mid sixties was offset by construction in other areas of the Willamette

Valley. Increases in commercial and industrial building, highways, schools and other facilities is now well established and should continue to carry the Valley employment in this industry through the seventies and maintain the projected increases through to year 2000.

2. Trade, Communications and Utilities

Transportation has experienced a lengthy decline which has not been made up in the communications and utilities industries. Some of this decrease has been caused by productivity -- changes in the use of fuels has gradually lowered crew requirements on the railroads -- as unions permit. The use of airlines and private cars plus use of company owned trucks also shifts employment.

In the future size of population will influence the growth of these industries while continued decline will be experienced with these industries as a percentage of the total; employment will expand to meet the service demands of an expanding population.

3. Wholesale and Retail Trade

Productivity has allowed trade to expand its employment rapidly while also creating higher volumes of sales per employee. The Valley has experienced the expanding of discount, self-service operations and mall-type shopping areas. Increasing leisure, income and population are all working together to provide inputs to the continued rising employment in the trade industries, which will be the highest employer by the year 2000 if economic predictions are correct.

4. Finance, Insurance and Real Estate

In the Willamette Valley, 18,860 persons were employed in finance, insurance and real estate in 1960. This increased to 30,000 in 1969.

Regionally, the Pacific Northwest has expanded in these industries faster than the nation. In finance, growth has been hinged to increases in family and corporate incomes.

Insurance has experienced the expansion policies of home offices located in other parts of the nation -- the Valley and Oregon, in general has gained employment as the insurance industry expanded and provided incentives for more agencies throughout the Valley.

It is hard to identify all real estate employment because of the self-employed, working solely on commissions. The Valley does have a real estate industry that is keeping pace with the increase in population, income and state economy.

5. Services

Employment in service industries represents an increasing share of total employment. In 1960 there were 43,249 employed which almost doubled to 83,770 by 1970, 44.2% increase

Most important contributions to this increase was fostered by the hotel/motel business, which reflect the rise in tourism previously talked about. Increasing efforts of local Chambers of Commerces to attract conventions also has contributed to this industry's growth.

6. Government

Increases in government employment, including education, has shown an increasing trend upward. From 1960 to 1969 this has accounted for 34,763 more employees, a rise of 52.7%.

Compared to the nation, the Willamette Valley contains more state-operated educational institutions -- there are more persons employed in education per capita here in the Valley than in the nation. Approximately 65% of the employment pertains to public elementary and secondary schools.

State government contributes much to employment in the Valley -- coupled with Federal and local government, employment is well over 100,000 throughout the Valley. Continued increases in employment are expected to keep pace with the population and its requests for service.

7. Self-employed

Information for this category comes mostly from data submitted in support of unemployment compensation laws -- from 1960 to 1969 the self-employed increased approximately $4,590 or .07%. This was a decrease when compared to our employment. This trend is expected to continue as more and more services are supplied by franchises and other operators consolidate to maximize business opportunities.

CHART 1

POPULATION(4)

(May not total because of rounding)

	1960	1970	1980	1990	2000
Willamette Valley	1,191,278	1,475,384	1,732,998	2,082,132	2,512,031
Lower Area	750,467	909,465	1,045,499	1,282,815	1,579,578
Middle Area	277,921	352,571	419,232	480,901	558,412
Sub-Area A	178,981	226,900	269,985	309,700	359,617
Sub-Area B	98,940	125,700	149,247	171,201	198,795
Upper Area	162,890	213,358	268,267	318,416	378,041

CHART 2

PERCENTAGE INCREASE

(May not total because of rounding)

	1960	1970	1980	1990	2000
Willamette Valley	--	23.8	17.4	20.1	20.6
Lower Area	--	21.1	14.9	22.6	23.1
Middle Area	--	26.8	18.9	14.7	16.1
Sub-Area A	--	26.7	18.9	14.7	16.1
Sub-Area B	--	27.0	18.7	14.7	16.1
Upper Area	--	30.9	25.7	18.6	18.7

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(4) Intergovernmental Environmental Planning, Executive Department, Economic Development Section, September 1971. (See Appendix 1)

CHART 3

PERCENTAGE OF TOTAL POPULATION

(May not total because of rounding)

	1960	1970	1980	1990	2000
Willamette Valley	100.0	100.0	100.0	100.0	100.0
Lower Area	62.9	61.6	60.3	61.6	62.8
Middle Area	23.3	23.8	24.1	23.0	22.2
Sub-Area A	15.0	15.3	15.5	14.8	14.3
Sub-Area B	8.3	8.5	8.6	8.2	7.8
Upper Area	13.6	14.4	15.4	15.2	15.0

CHART 4

POPULATION PER ACRE, 1960-2000

(May not total because of rounding)

	Acres	1960	1970	1980	1990	2000
Willamette Valley	8,817,920[5]	.14	.17	.20	.24	.28
Lower Area	2,343,680	.32	.39	.45	.55	.67
Middle Area	3,560,960	.08	.10	.12	.14	.16
Sub-Area A	1,672,320	.11	.14	.16	.18	.22
Sub-Area B	1,888,640	.05	.07	.08	.09	.11
Upper	2,913,280	.06	.07	.09	.11	.13

(5) Total acres of all counties.

CHART 5

POPULATION PER ACRE, 1960-2000 - PERCENTAGE OF INCREASE

(May not total because of rounding)

	1970	1980	1990	2000
Willamette Valley	21.4	17.6	20.0	16.6
Lower Area	21.8	15.3	22.2	21.8
Middle Area	25.0	20.0	16.6	14.2
Sub-Area A	27.2	14.2	12.5	22.2
Sub-Area B	40.0	14.2	12.5	22.2
Upper Area	16.6	28.5	22.2	18.1

CHART 6

POPULATION BY BROAD GROUPS

1970(6)

	Total	1-19	20-34	35-44	45-54	55-64	64-74	+75
State of Oregon	2,091,385	773,051	417,215	225,782	243,391	205,147	135,922	90,877
Willamette Valley	1,475,384	543,409	309,847	157,603	169,111	138,198	92,689	64,595
Lower Area	909,465	327,169	186,623	98,262	107,926	88,851	58,610	42,084
Middle Area	352,561	134,556	73,392	36,347	37,952	31.506	23,201	15,607
Sub-Area A	226,871	85,432	43,070	23,605	25,015	21,579	16,910	11,260
Sub-Area B	125,690	49,124	30,322	12,742	12,937	9,927	6,291	4,347
Upper Area	213,358	81,684	49,832	22,994	23,233	17,833	10,878	6,904

(6) U.S. Census.

CHART 7

POPULATION BY BROAD AGE GROUPS - % OF TOTAL VALLEY

(May not total because of rounding)

	Total	1-19	20-34	35-44	45-54	55-64	64-74	+75
State of Oregon	100.0	37.0	19.9	10.8	11.6	9.8	6.4	4.3
Willamette Valley	100.0	36.8	21.0	10.7	11.5	9.3	6.3	4.4
Lower Area	100.0	36.0	20.5	10.8	11.9	9.8	6.4	4.6
Middle Area	100.0	38.1	20.8	10.3	10.7	8.9	6.5	4.4
Sub-Area A	100.0	37.7	18.9	10.4	11.0	9.5	7.5	5.0
Sub-Area B	100.0	39.1	24.1	10.1	10.3	7.9	5.0	3.5
Upper Area	100.0	38.3	23.4	10.8	10.9	8.4	5.1	3.2

CHART 8

POPULATION BY BROAD AGE GROUPS - % OF TOTAL AGE GROUP

(May not total because of rounding)

	Total	1-19	20-34	35-44	45-54	55-64	64-74	+75
State of Oregon	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Willamette Valley	70.5	70.2	74.2	69.8	69.5	67.4	68.2	71.1
Lower Area	43.4	42.3	44.7	43.5	44.3	43.3	43.1	46.3
Middle Area	16.8	17.4	17.5	16.0	15.5	15.3	17.0	17.1
Sub-Area A	10.8	11.0	10.3	10.4	10.2	10.5	10.2	12.3
Sub-Area B	6.0	6.3	7.2	5.6	5.3	4.8	4.6	4.7
Upper Area	10.2	10.5	11.9	10.1	9.5	8.6	8.0	7.5

CHART 9

POPULATION BY BROAD AGE GROUPS PROJECTED(7)

(May not total because of rounding)

	Total	1-19	20-34	35-44	45-54	55-64	64-74	+75
1980								
Willamette Valley	1,732,998	637,748	363,929	185,430	199,294	161,168	109,178	76,25
Lower Valley	1,045,499	376,384	214,327	112,913	124,414	102,458	66,911	48,09
Middle Valley	419,232	590,276	87,200	43,180	44,857	37,311	27,250	18,44
Sub-Area A	269,985	101,784	51,027	28,078	29,698	25,648	20,248	13,49
Sub-Area B	149,247	58,355	35,968	15,073	15,372	11,790	7,462	5,22
Upper Valley	268,267	102,906	62,640	28,892	29,187	22,400	13,654	8,58
1990								
Willamette Valley	2,082,132	766,224	437,247	222,788	239,445	193,638	131,174	91,61
r Valley	1,282,815	461,815	262,977	138,544	152,654	125,715	82,100	59,00
Middle Valley	480,901	184,669	100,027	49,532	51,456	42,800	31,258	21,15
Sub-Area A	309,700	116,756	58,533	32,208	34,067	29,421	23,227	15,48
Sub-Area B	171,201	66,939	41,259	17,291	17,633	13,524	8,560	5,99
Upper Valley	318,416	122,048	74,350	34,293	34,643	26,587	16,207	10,28
2000								
Willamette Valley	2,512,031	924,427	527,526	268,787	288,883	233,618	158,257	110,52
Lower Valley	1,579,578	568,648	323,813	170,594	187,969	154,798	101,092	72,66
Middle Valley	558,412	211,078	116,149	57,516	59,750	49,698	36,296	24,57
Sub-Area A	359,617	135,575	67,967	37,400	39,557	34,163	26,471	17,98
Sub-Area B	198,795	77,728	47,909	20,078	20,475	15,704	9,939	6,95
Upper Valley	374,041	143,369	87,338	40,284	40,695	31,232	19,038	12,08

(7) Straight line -- same relationships as 1970 U.S. Census.

CHART 10

WILLAMETTE VALLEY TOTAL EMPLOYMENT

(From Oregon S.I.C. Codes)

	1960	1965	1969	1960-69 ±	1960-69 % ±
Total Valley Employment	460,100	542,640	625,180	165,080	35.8
Manufacturing	96,720	109,100	130,072	33,352	34.4
Trade	84,290	101,470	118,780	34,490	40.9
F.I.R.E.	18,860	23,870	30,000	11,140	59.0
Services	43,249	62,400	83,770	40,521	93.6
Government	65,890	81,390	100,653	34,763	57.7
T.C.P.U.	32,660	35,270	36,885	4,225	12.9
Construction	19,780	22,790	26,250	6,470	32.7
Self-employed	65,430	75,420	70,020	4,590	7.0
Agriculture	34,059	30,930	28,750	(5,309)	(15.5)

CHART 11

PERCENTAGE OF TOTAL VALLEY EMPLOYMENT

Total Valley Employment	100.0	100.0	100.0	.0	.0
Manufacturing	21.0	20.1	20.8	.2	(.9)
Trade	18.3	18.7	19.0	.7	3.8
F.I.R.E.	4.0	4.4	4.8	.8	20.0
Services	9.4	11.5	13.4	4.0	42.5
Government	14.3	15.0	16.1	1.8	12.5
T.C.P.U.	7.1	6.5	5.9	(1.2)	(16.9)
Construction	4.3	4.2	4.2	(.1)	(2.3)
Self-employed	14.2	13.9	11.2	(3.0)	(21.1)
Agriculture	7.4	5.7	4.6	(2.8)	(37.8)

CHART 12

WILLAMETTE VALLEY TOTAL EMPLOYMENT

(Projected by "Foresight")

	1969	1980	1990	2000	1962-2000 ±	1962-2000 % ±
Total Valley Employment	625,180	729,562	880,854	1,078,038	452,858	72.4
Manufacturing	130,072	158,585	189,783	231,779	101,707	78.1
Trade	118,780	154,937	189,783	231,780	113,000	95.1
F.I.R.E.	30,000	38,666	51,970	62,526	32,526	108.4
Services	83,770	110,663	141,012	172,486	88,716	105.9
Government	100,653	95,243	119,796	146,613	45,960	45.6
T.C.P.U.	36,885	47,421	51,970	63,604	26,719	72.4
Construction	26,250	35,018	44,923	54,979	28,729	109.4
Self-employed	70,020	74,438	87,204	106,725	36,705	52.4
Agriculture	28,750	14,591	6,165	7,546	21,204	(73.7)

CHART 13

PERCENTAGE OF TOTAL VALLEY EMPLOYMENT

Total Valley Employment	100.0	100.0	100.0	100.0	.0	.0
Manufacturing	20.8	21.7	21.5	21.5	.7	3.3
Trade	19.0	21.2	21.5	21.5	2.5	13.1
F.I.R.E.	4.8	5.3	5.8	5.8	1.0	20.8
Services	13.4	15.2	16.0	16.0	2.6	19.4
Government	16.1	13.1	13.6	13.0	2.5	(15.5)
T.C.P.U.	5.9	6.5	5.9	5.9	.0	.0
Construction	4.2	4.8	5.1	5.1	.9	21.4
Self-employed	11.2	10.2	9.9	9.9	(1.3)	(11.6)
Agriculture	4.6	2.0	.7	.7	(3.9)	(84.7)

CHART 14

WILLAMETTE VALLEY TOTAL EMPLOYMENT

PRIMARY AND SECONDARY INDUSTRIES(8)

	1960	1965	1969	1960-69 ±	1960-69 ±
Total Valley Employment	460,100	542,260	625,180	165,080	35.8
Primary Total	130,779	140,030	158,822	28,043	21.4
Manufacturing	96,720	109,100	130,072	33,352	34.4
Agriculture	34,059	30,930	28,750	5,309	(15.5)
Secondary Total	329,321	402,730	466,358	137,037	41.6
Trade	84,290	101,470	118,780	34,490	40.9
F.I.R.E.	18,860	23,870	30,000	21,140	112.0
Services	43,249	62,400	83,770	19,151	44.2
Government	65,890	81,390	100,653	34,763	52.7
T.C.P.U.	32,660	35,770	36,885	4,225	12.9
Construction	19,780	22,790	26,250	6,470	32.7
Self-Employed	65,430	75,420	70,020	4,590	7.0

CHART 15

PERCENT OF TOTAL VALLEY EMPLOYMENT

	1960	1965	1969	1960-69 ±
Total Valley Employment	100.0	100.0	100.0	100.0
Primary Total	28.4	25.8	25.4	16.9
Manufacturing	21.0	20.1	20.8	20.2
Agriculture	7.4	5.7	4.5	3.2
Secondary Total	71.5	74.1	74.5	83.0
Trade	18.3	18.7	18.9	20.8
F.I.R.E.	4.0	4.4	4.7	12.8
Services	9.3	11.5	13.3	11.6
Government	14.3	15.0	16.0	21.0
T.C.P.U.	7.0	6.5	5.8	2.5
Construction	4.2	4.2	4.1	3.9
Self-Employed	14.2	13.9	11.1	2.7

(8) Oregon S.I.C.

CHART 16

WILLAMETTE VALLEY TOTAL EMPLOYMENT[9]

PRIMARY AND SECONDARY INDUSTRIES[10]

	1969	1980	1990	2000	1969-2000 ±	1969-2000 % ±
Total Valley Employment	625,180	729,562	880,854	1,078,038	452,888	72.4
Primary Total	158,822	173,176	195,948	239,325	80,503	50.6
Manufacturing	130.072	158,585	189,783	231,779	101,707	78.1
Agriculture	28,750	14,591	6,165	7,546	(21,204)	(73.7)
Secondary Total	466,358	556,386	684,906	838,713	372,355	79.8
Trade	118,780	154,937	189,783	231,780	113,000	95.1
F.I.R.E.	30,000	38,666	51,970	62,526	32,526	108.4
Services	83,770	110,663	141,012	172,486	88,716	105.9
Government	100,653	95,243	119,796	146,613	45,960	45.6
T.C.P.U.	36,885	47,421	51,970	63,604	26,719	72.4
Construction	26,250	35,018	44,923	54,979	28,729	109.4
Self-Employed	70,020	74,438	87,204	106,725	36,705	52.4

CHART 17

PERCENTAGE OF TOTAL VALLEY EMPLOYMENT

	1969	1980	1990	2000	1969-2000 ±
Total Valley Employment	100.0	100.0	100.0	100.0	100.0
Primary Total	25.4	23.7	22.2	22.2	17.7
Manufacturing	20.8	21.7	21.5	21.5	22.4
Agriculture	4.5	1.9	.6	.6	(4.6)
Secondary Total	74.5	76.2	77.7	77.7	82.2
Trade	18.9	21.2	21.2	21.5	24.9
F.I.R.E.	4.7	5.2	5.8	5.7	7.1
Services	13.3	15.1	16.0	15.9	19.5
Government	16.0	13.0	13.5	13.5	10.1
T.C.P.U.	5.8	6.4	5.8	5.8	5.9
Construction	4.1	4.7	5.0	5.0	6.3
Self-Employed	11.1	10.2	9.8	9.8	8.1

(9) Projected by "Foresight"
(10) Oregon S.I.C.

CHART 18

WILLAMETTE VALLEY PROJECTIONS[11]

COG Projections of Population

Willamette Valley	1960	1970	1980	1990	2000
Baseline	1,168,811	1,495,691	1,740,839	2,083,012	2,474,653
Lower Area					
Baseline	728,000	880,675	1,022,000	1,232,000	1,480,000
Middle Area					
Baseline	277,921	399,615	444,499	525,402	620,612
1. Middle Subarea A					
Baseline	179,889[12]	276,871	282,060	346,720	424,062
2. Middle Subarea B					
Baseline	98,032	122,744	162,439	178,682	196,550
Upper Area					
Baseline	162,890	215,401	274,340	325,610	374,041[13]

(11) Projections are from data supplied from Columbia Region Assocation of Governments, Mid Willamette Valley Council of Governments, Oregon District 4 Council of Governments (less Lincoln County) and Lane Council of Governments.

(12) 1970 Census.

(13) Willamette Valley Population Projection, Executive Department, 1971.

CHART 19

WILLAMETTE VALLEY PROJECTIONS (14)

COG Projections of Population

Percentage of Increase

Willamette Valley	1970	1980	1990	2000
Baseline	27.9	16.3	19.6	18.8
Lower Area				
Baseline	21.0	16.0	20.5	20.1
Middle Area				
Baseline	43.8	11.2	18.2	18.1
1. Middle Subarea A				
Baseline	53.9	1.9	22.9	22.3
2. Middle Subarea B				
Baseline	25.2	23.3	10.0	10.0
Upper Area				
Baseline	32.2	27.4	18.7	14.9

(14) Same as page .

APPENDIX A

Intergovernmental Environmental Planning
September 1, 1971

I. PRELIMINARY BENCHMARKS - POPULATION AND EMPLOYMENT

A. Introduction

The projections of employment and population contained in this report represent very rough estimates of growth rates expected over the next 40 years. Limitations of time and resources in this project made it impossible to do a very acceptable job for planning purposes. These restrictions, for example, limited our ability to construct appropriate economic relationships and to test our assumptions. As a result, we had to accept many of the conclusions derived from other studies, changing only those which appeared to be quite unreasonable in light of current information. Generally, two fairly recent studies were used to set the framework for the projections: Appendix C of the Willamette Basin Review, and the recent projections prepared jointly by the office of Business Economics, Department of Commerce, and Economic Research Service, Department of Agriculture. Both of these project employment and population to the year 2020. The former relates directly to the Willamette Basin, while the latter encompasses a much larger region (but does not include Lane County).

Since the projections in these do not include the same geographical area, it was difficult to compare the results. However, despite this problem, we noted rather significant differences with respect to broad economic assumptions and projected structural relationships. Our projections were made by selecting those factors from each study which seemed to be the most reasonable in light of current events (or choosing our own if neither seemed reasonable) and by forecasting from the most recent base (1970 census and employment data).

B. Procedure

The general procedure used here consisted of projecting employment for the entire Willamette Valley and distributing the total figure among the three subregions. Population projections were then built up from the employment estimates for each 10-year period. The link between employment and population was provided by our projections of overall labor force participation rates (LFPR) for each subregion and for the Valley as a whole (the latter was used as a check against the summation of the population forecasts of each subregion). The use of an overall LFPR is very gross and can lead to serious error; however, time did not permit an analysis of trends in each age-sex specific participation rate. Also, since a computer program

was not used to project natural population growth (zero net migration), age-sex cohorts were not available anyway. The rough overall LFPR's for each area and the Valley were projected using the assumption implicit in the OBE-ERS study that the rate will increase slightly over the next 20 years and then level off afterwards. This is in contract to the Basin Study's and Bonneville's assumption of a declining rate in the future (both studies significantly over-estimated population growth in relation to expected gains in employment for 1970 because of this assumption). If an error exists in our projected LFPR's, it is likely to be conservative with respect to population. In other words, since our projections of overall participation rates are biased in an upward direction, the resulting population projections have a greater probability of being on the low side.

For the Willamette Valley, the employment and population projections are ultimately based upon two assumed rates of employment growth in the basic industries (as defined in the Basin Study) and two different growth paths of the basic-to-total employment multiplier. Out of the four possible outcomes, three were chosen as the high, baseline and low projections (low basic-low multiplier, high basic-low multiplier, and high basic-high multiplier). Employment was then distributed among the subregions using the percentage shares of each as implicitly contained in the projections of the Willamette Basin Study.

Since we could not use the computer program at Portland State, it is impossible to distinguish between projected growth attributable to natural increase and that caused by net in-migration. Hence, all that we have here is an "economic demand" projection of employment with a "required labor supply" projection of population. As is the case with any very long-run forecast, the possibility of error becomes progressively larger as our time horizon increases.

C. Assumptions

1. Employment and population projections for the entire U.S. by OBE-ERS were used as guidelines for our growth assumptions relative to the Willamette Valley.

2. Many of the assumptions concerning industrial growth and diversification were taken from "Appendix C" of the Willamette Basin Review.

3. The basic non-basic industry dichotomy was used to project total employment.

4. Basic industries were defined as:

   - Mining
   - Agriculture
   - Federal Government
   - Manufacturing

5. Total employment was derived from projections of basic employment through a projection of the basic-to-total employment multiplier.

6. Two projections were made for employment in basic industries.

   a. Both projections assumed a slower rate of growth from 1970 to 1990, after which the rate is expected to pick up again through the year 2010. Several reasons for the assumption include:

      - The rate of decline in agricultural employment is expected to slow down significantly after 1980 and level off after 1990. Beyond the year 2000 employment in agriculture should be relatively stable. In other words, as we approach the year 2000 the effects of technological change upon agricultural employment will have diminished significantly, and furthermore will be offset by expected increases in the demand for food products.

      - Manufacturing in general is expected to register a slower growth rate over the next ten years due principally to projected declines in lumber employment and to an expected slower rate of growth in the metal-working industries. After 1980, the rate is expected to pick up again receiving much impetus from all sectors of manufacturing. Also, beyond the year 2000, employment in lumber production is expected to level off and perhaps increase.

      - Growth in Federal Government employment is projected to increase gradually from now until 1990, and then level off. The decreasing rate experienced over the last few years has been due largely to declines in the area of national defense. As the demands for more domestic services increase, federal employment is likely to grow at a healthy rate in the Valley.

   b. Differences in our two projections were mainly ones of magnitude. The general direction of growth assumed for the various industries described above is the same for both estimates of basic employment.

7. Two projections were made of the basic-to-total employment multiplier:

   a. Both projections call for a gradually increasing multiplier throughout the period 1970-2010. Our estimates were based upon OBE-ERS's implicit multiplier projections for the entire Northwest portion of Oregon, including five counties in Southern Washington (Economic Area No. 157).

b. Again, as in our projections of basic employment, the difference between our two multiplier projections involve only magnitudes. In essence, the direction and marginal rates of change for both are the same.

8. Projections for each economic sub-area were derived by distributing our employment estimates for the Valley among these sectors. The distributions were made by using those implicit in the Willamette Basin Review (Appendix C). In other words, we didn't have time to project independently for each sub-area and likewise there wasn't time to scrutinize the study's assumptions here.

9. Employment projections for each area were translated into estimates for the civilian labor force by assuming gradually decreasing unemployment rates to the year 2000 and a leveling off thereafter (as the rate for the Valley approaches that projected for the U.S.).

10. Finally, population projections were derived from projections of the civilian labor force through assumed trends in labor force participation rates. Here OBE-ERS's implied trends in this regard were used as guidelines in our estimates. Generally, population in each sub-area was projected on the basis of increasing overall participation rates from now to the year 1990, with a leveling off thereafter. Two forces seem to be working in this direction: (1) larger than expected increases in the rates for women in various age groups, and (2) the relatively high number of persons expected to enter the prime working age group over the next ten to fifteen years.

POPULATION

	1960	1970	1980	1990	2000	2010
WILLAMETTE VALLEY						
High	1,191,278	1,475,384	1,843,056	2,202,046	2,679,501	3,340,259
Baseline	1,191,278	1,475,384	1,732,998	2,082,132	2,512,031	3,091,105
Low	1,191,278	1,475,384	1,687,914	1,973,633	2,316,211	2,768,377
LOWER AREA						
High	750,467	909,465	1,108,877	1,356,695	1,684,885	2,152,489
Baseline	750,467	909,465	1,045,499	1,282,815	1,579,578	1,991,933
Low	750,467	909,465	1,018,297	1,215,967	1,456,446	1,783,965
MIDDLE AREA						
High	277,921	352,571	444,649	508,598	595,638	694,386
Baseline	277,921	352,571	419,232	480,901	558,412	642,590
Low	277,921	352,571	408,329	455,843	514,881	575,501
1. Middle: Subarea A						
High	178,981	226,900	286,354	345,593	413,729	487,849
Baseline	178,981	226,900	269,985	309,700	359,617	413,828
Low	178,981	226,900	262,964	293,563	331,583	370,623
2. Middle: Subarea B						
High	98,940	125,700	158,295	191,042	228,707	269,681
Baseline	98,940	125,700	149,247	171,201	198,795	228,762
Low	98,940	125,700	145,365	162,280	183,298	204,878
UPPER AREA						
High	162,890	213,358	284,530	336,753	398,978	493,384
Baseline	162,890	213,358	268,267	318,416	374,041	456,582
Low	162,890	213,358	261,288	301,823	344,884	408,911

CIVILIAN LABOR FORCE

	1960	1970	1980	1990	2000	2010
WILLAMETTE VALLEY						
High	484,450	658,220	809,193	973,168	1,200,765	1,502,348
Baseline	484,450	658,220	762,942	920,174	1,125,717	1,390,286
Low	484,450	658,220	743,094	872,224	1,037,964	1,245,133
LOWER AREA						
High	316,700	426,600	504,539	617,296	775,047	990,145
Baseline	316,700	426,600	475,702	583,681	726,606	916,289
Low	316,700	426,600	463,325	553,265	669,965	820,624
MIDDLE AREA						
High	105,080	142,270	182,306	211,068	250,168	295,114
Baseline	105,080	142,270	171,885	199,574	234,533	273,101
Low	105,080	142,270	167,415	189,175	216,250	244,588
1. Middle: Subarea A						
High	68,270	89,560	114,853	136,922	165,941	198,056
Baseline	68,270	89,560	108,288	125,732	147,756	172,054
Low	68,270	89,560	105,471	119,180	136,237	154,090
2. Middle: Subarea B						
High	36,810	52,710	67,453	80,415	97,458	116,319
Baseline	36,810	52,710	63,597	73,842	86,777	101,047
Low	36,810	52,710	61,944	69,995	80,013	90,498
UPPER AREA						
High	62,670	89,350	122,348	144,804	175,550	217,089
Baseline	62,670	89,350	115,355	136,919	164,578	200,896
Low	62,670	89,350	112,354	129,784	151,749	179,921

TOTAL EMPLOYMENT

	1960	1970	1980	1990	2000	2010
WILLAMETTE VALLEY						
High	460,100	625,180	773,788	931,584	1,149,907	1,438,737
Baseline	460,100	625,180	729,562	880,854	1,078,038	1,331,420
Low	460,100	625,180	710,581	834,953	994,001	1,192,413
LOWER AREA						
High	301,800	408,000	482,844	591,370	742,495	948,559
Baseline	301,800	408,000	455,247	559,166	696,089	877,805
Low	301,800	408,000	443,402	530,028	641,826	786,158
MIDDLE AREA						
High	98,740	133,530	174,102	201,781	239,411	282,424
Baseline	98,740	133,530	164,151	190,793	224,448	261,358
Low	98,740	133,530	159,881	180,851	206,951	234,071
1. Middle: Subarea A						
High	63,820	83,840	109,684	130,898	158,805	189,540
Baseline	63,820	83,840	103,415	120,200	141,402	164,656
Low	63,820	83,840	100,725	113,936	130,379	147,464
2. Middle: Subarea B						
High	34,920	49,690	64,418	76,876	93,267	111,317
Baseline	34,920	49,690	60,736	70,593	83,046	96,702
Low	34,920	49,690	59,156	66,915	76,572	86,607
UPPER AREA						
High	59,560	83,650	116,842	138,433	168,001	207,754
Baseline	59,560	83,650	110,164	130,895	157,501	192,257
Low	59,560	83,650	107,298	124,074	145,224	172,184

NATURAL RESOURCES

INTRODUCTION

The sections that follow present the findings of the Natural Resource Task Force for Phase I of the "Foresight" Project. The procedures used in this phase have been simplistic in nature. Data has been gathered and is presented on an element-by-element basis within the total of the responsibilities assigned to the Natural Resources Task Force. Those considered are Air Quality, Solid Waste, Water Quality, Water Supply, Power, Land Use, Geology, Forests, Parks and Recreation, and Fish and Wildlife. The state agency that has primary responsibility for an element projected probable trends for that element through the year 2010. Constant assumptions used by each agency for the projections were:

1. Population increase per the mid-benchmark population forecast as discussed in the Economic Policy Task Force Section.

2. Continuation of existing laws, rules and regulations.

3. Continuation of the present industrial ratios in the Basin.

Other specific assumptions relating to each element are listed in the individual sections that follow.

The methodology utilized in this phase of the project results in a basic inventory of the existing status of our natural resources and projections on a straight trend line or "business as usual" basis. Interrelationships and technical advancement factors have not been introduced into the data. Thus conflicts between elements and between straight-line projections and the likely "real world" are not resolved during this phase of the project.

While not resolving conflict, the effort to date does point to obvious conclusions and conflicts that need additional attention. The information in this report will provide the base for the next phase of the "Foresight" project. That phase will, through the use of scenarios, attempt to resolve the identified conflicts and weld the projections in this report into integrated possible futures.

The following highlights some of the Phase I findings for each of the elements reviewed by the Natural Resource Task Force.

Air Quality

The quality of the air has deteriorated gradually until recent years. Existing control measures have stemmed the deterioration and will result in improved air quality through the year 1990. After 1990, increasing population growth in the Basin will cause an increase in emission levels. To avoid this increase and thus maintain the improved level of air quality in the Basin, more stringent controls will be necessary. Such controls could have significant impact on industrial development and modes of transportation.

Solid Waste

Amounts of solid waste generated in the Basin are projected to increase over 2.5 times the 1970 level by the year 2000. A review of the impacts of this increase shows that (1) suitable sites within the Basin are not available to accommodate the waste load; (2) there is a direct and significant relationship between solid waste, air and water quality programs, whereas, if any one of the above are modified or strengthened the result could be a negative reaction on the other two areas; and (3) there is a need in the near future to look to alternative methods of disposing solid waste, such as recycling and/or high efficiency incineration.

Water Quality

The quality of water in the Basin over the past several decades has been significantly improved. However, to maintain this current high quality level as population grows, more efficient treatment methods will be necessary. This will mean tertiary treatment plants for all major discharges in the Basin. This requirement would have severe economic impact on the Basin's citizens and industry.

Water Supply

In order to respond to future consumptive needs and to maintain necessary nonconsumptive levels, such as stream flow maintenance for water quality and fish life, additional storage capacity of winter runoff is required. In addition, modification of water use patterns, i.e., recycling waste water, probably will be required to meet needs.

Power

Projections show that significant new sources of electrical energy will be required continuously over the next 40 years. To meet projected needs, a mix of all sources of power including hydroelectric, fossil fuel and nuclear sources will probably be developed. Development of these sources, however, will require careful planning and control to avoid environmental degradation.

The Phase I projections did not forecast demands on other energy sources such as Natural Gas and Oil. This should be done early in the next phase of the project.

Lands

Acreage required for urban growth is projected to increase from 4.3 percent of the total Basin acreage in 1963 to 10 percent by the year 2020. A detailed inventory should be initiated to relate projected land use with known land capability. The results of such a study are needed to fully analyze the impacts of urban growth in the Valley.

Geology

If present urban growth patterns and consumption rates of sand and gravel are continued, all known quantities of sand and gravel reserves in the Willamette Valley will be exhausted by shortly after the year 2000. A study to determine the exact location of sand and gravel reserves is a necessity if urban growth is to be planned in such a way as to protect and preserve this resource.

Forest Resources

Projections show that the forest industry will not be able to carry the same proportion of employment in future years as it has in the past. This results from a growing total Basin population compared to a relatively fixed level of forest resources. This is not to say, however, that the share of economy from the forest industry will not grow in the future. This may be possible through a change in emphasis to apply a larger percentage of the forest resource to high economic yield products.

Parks and Recreation

With the vast expanses of public land ownership in Oregon, the nonurban recreational needs can be met in the future. However, meeting future urban park needs is a major problem. We are already below established standards for urban park acres per capita. Meeting increased future needs will conflict with other uses of high value lands near and in urban areas.

Fish and Wild Life

The number of licensed anglers in the Basin is growing at a much more rapid rate than total population growth. However, existing angling catch ratios can be maintained in future years if minimum stream flows and water quality standards, along with other habitat factors, can be maintained and if artificial production of fish is increased. The number of hunters is increasing at approximately the same rate as the population. Increased urbanization and intensified agriculture is reducing available habitat for game animals. Thus the available game within the Valley will not keep pace with the increased number of hunters.

AIR QUALITY

- OR -

HOW OFTEN CAN YOU SEE THE MOUNTAINS?

PRESENT STATUS:

The quality of our air is determined by two sets of factors: (1) Pollutant emission levels, types and duration; and (2) Meteorologic and topographic conditions. This report will not detail the meteorology and topography of the Willamette Basin for they are amply described in numerous other works. The impact of this factor on the air quality of the Basin is succinctly put by the Advisory Committee on Environmental Science and Technology in their report "Environment Quality in Oregon 1971." They stated that:

> "Western Oregon has the highest potential, on a meteorological basis, for an air pollution problem of any area in the continental United States. The capacity of the atmosphere in this area to accept and disperse or assimilate air pollutants is extremely limited. Low wind movement and frequent inversions are principal factors in this restricted natural ventilation."

The types of emissions are sulfur oxides, nitrogen oxides, organic gases, carbon monoxide, and particulates. A brief description of these types is attached. Until recently, emission levels from all sources have been increasing in the Willamette Basin. By 1970 emissions had reached the levels shown in the attached tables.

PROJECTIONS:

Projected emission levels through the year 2010 by type and source are shown in the attached tables. Generally, in 1980 and 1990 emission levels will be much lower than at present. This is due to control measures currently authorized to be implemented in the 1970's that will reduce emissions from automobiles and eliminate field burning and wigwam burners. After 1990, assuming no further tightening of control measures, emission levels will again turn to an upward trend.

The attached illustration relates these projections to a calculated percent of time a person can see the mountains (Mt. Hood from Portland).

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

While existing control measures will result in improved air quality, growth in the Valley will negate most of the improvement by 2000. To achieve continued improvement, even stricter controls will be necessary in the future. These controls potentially have significant impacts on modes of transportation and types of industry that will prevail in the Valley.

The projections shown are for total emission levels for the Basin. Even though Basin totals may show improvement under existing control measures, problems may occur in specific areas from concentration of emission sources that would require additional controls to meet accepted air quality standards.

PROJECTION ASSUMPTIONS:

1. Only existing federal, state and local regulations were applied to each source type.

2. Increase in emissions was considered to be directly proportional to population increase.

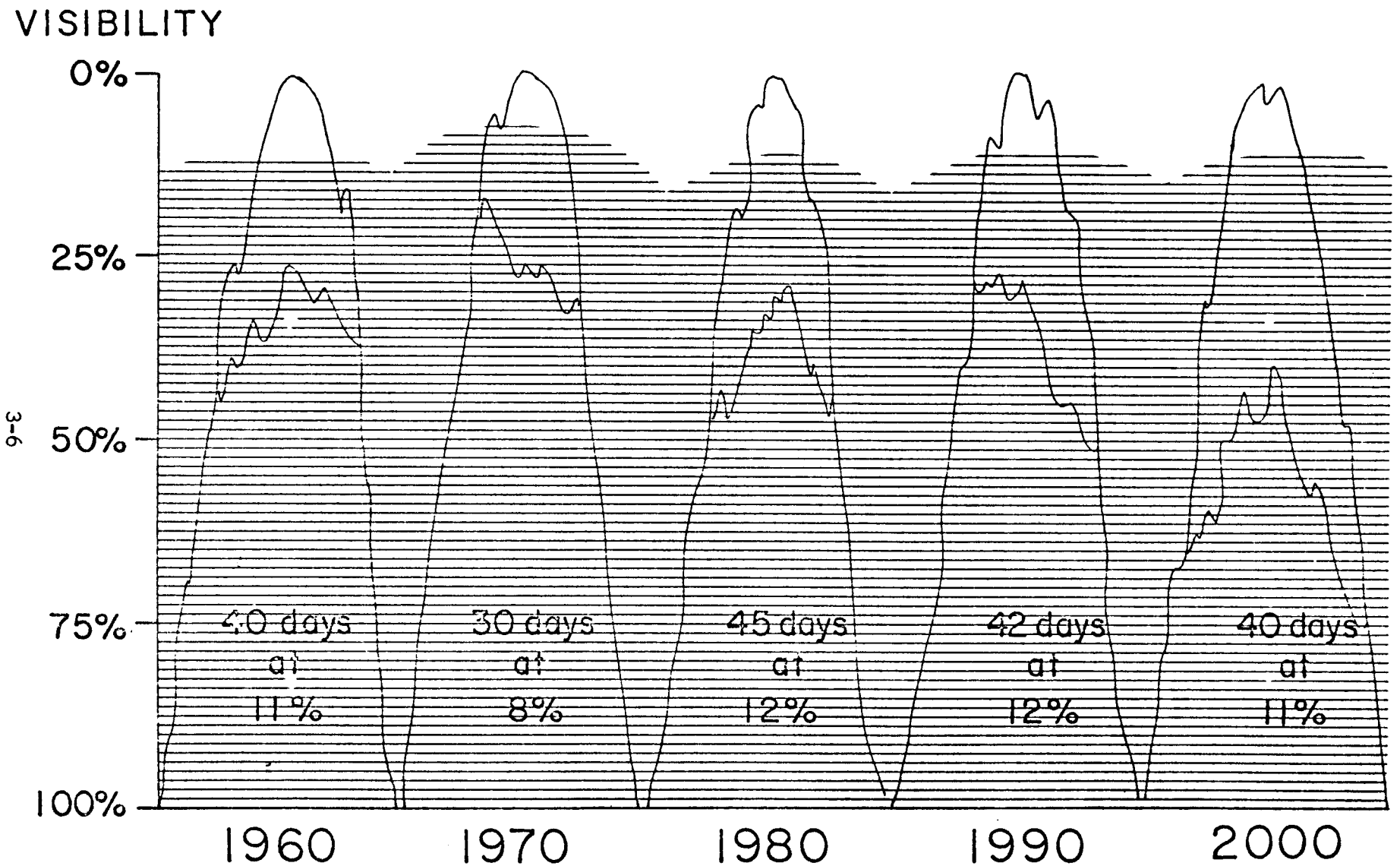
DATA SOURCES:

Oregon State Department of Environmental Quality

Advisory Committee on Environmental Science and Technology report "Environmental Quality in Oregon 1971"

Department of Environmental Quality report "Oregon's Air Quality and Program for Years 1968 and 1969"

% OF TIME MOUNTAINS ARE VISIBLE



DESCRIPTION OF EMISSION TYPES

Sulfur oxides - a normal product of combustion of sulfur-containing fuels such as coal and oil; also emitted in large quantities by sulfite pulp mills and certain metallurgical processes. These acrid gases can cause severe health effects when combined with high levels of suspended particulate.

Nitrogen oxides - one of two necessary components in the photochemical smog reaction; this class of pollutants includes nitrogen dioxide, a brown gas which of itself contributes to visibility reduction. Nitrogen oxides are emitted by all combustion processes, particularly by the internal combustion engine.

Organic gases - organic compounds which form the other major component of photochemical smog; include certain odorous compounds. About 60 percent come from motor vehicles, the remainder from combustion processes and from evaporation of gasolines, solvents, and paints.

Carbon monoxide - a colorless, odorless gaseous product of incomplete combustion that is lethal in high concentrations and can cause noticeable effects on the most sensitive members of society in concentrations of 0.002 percent when maintained for 6 to 8 hours. Cigarette smoke contains CO to the extent that the average smoker's intake is equivalent to 0.003 percent concentration in outside air. Motor vehicles are the most important source although wigwam burners, field burning, and other open fires contribute large amounts in many parts of Oregon.

Particulate matter - small solid and liquid particles such as smoke and dust. Suspended particulate is smallest, stays in the air for long periods, and causes most visibility-reduction problems; particulate fallout consists of larger dust and soot particles that contribute to local nuisance and soiling.

Photochemical smog - a mixture of the above contaminants with the products of extremely complex chemical reactions occurring when nitrogen oxides and hydrocarbons are irradiated by sunlight under warm stable atmospheric conditions, producing ozone, aldehydes, and other eye-irritating compounds.

Projected Emissions for the Willamette Valley

Sulfur Oxides Emissions in tons/year

Source Category	1970	1980	1990	2000	2010
Residential Fuel Cmbs	3030	3636	4363	5236	6283
Commercial Fuel Cmbs	4656	5587	6704	8045	9654
Industrial Fuel Cmbs	6017	7220	8664	10397	12476
Total Fuel Cmbs	13703	16444	19733	23680	28416
Chemical Industry	0	0	0	0	0
Food/Agric. Industry	0	0	0	0	0
Metallurgical Industry	1450	1740	2088	2506	3007
Mineral Prod. Industry	104	125	150	180	216
Petrochemical Industry	70	84	101	121	145
Wood Processing Industry	5481	2115	2538	3046	3655
Other Industries	0	0	0	0	0
Total Process Loss	7105	4064	4877	5853	7023
Incineration	39	13	16	19	23
Open Burning	47	16	19	23	28
Wigwam Burners	14	0	0	0	0
Total Solid Waste	100	29	35	42	51
Motor Vehicles	2703	3865	5527	7904	11303
Total Transportation	4201	5663	7685	10494	14411
Field Burning	0	0	0	0	0
Forest Fires	0	0	0	0	0
Slash Burning	0	0	0	0	0
Total Miscellaneous	0	0	0	0	0
Total Valley	25109	26200	32330	40069	49901

Projected Emissions for the Willamette Valley

Nitrogen Oxides Emissions in tons/year

Source Category	1970	1980	1990	2000	2010
Residential Fuel Cmbs	1356	1627	1952	2342	2810
Commercial Fuel Cmbs	3047	3656	4387	5264	6317
Industrial Fuel Cmbs	15219	18263	21916	26299	31559
Total Fuel Cmbs	19622	23546	28255	33905	40686
Chemical Industry	0	0	0	0	0
Food/Agric. Industry	0	0	0	0	0
Metallurgical Industry	290	348	418	502	602
Mineral Prod. Industry	849	1019	1223	1468	1762
Petrochemical Industry	84	101	121	145	174
Wood Processing Industry	98	118	142	170	204
Other Industries	25	30	36	43	52
Total Process Loss	1346	1616	1940	2328	2794
Incineration	83	24	29	35	42
Open Burning	815	342	410	492	590
Wigwam Burners	140	0	0	0	0
Total Solid Waste	1038	366	439	527	632
Motor Vehicles	36000	19185	7742	11071	15831
Total Transportation	47164	32582	23818	30362	38980
Field Burning	1025	510	510	510	510
Forest Fires	172	172	172	172	172
Slash Burning	859	1031	1237	1484	1781
Total Miscellaneous	2094	1713	1919	2166	2463
Total Valley	71264	59823	56371	69288	85555

Projected Emissions for the Willamette Valley

Organic Gases Emissions in tons/year

Source Category	1970	1980	1990	2000	2010
Residential Fuel Cmbs	551	661	793	952	1142
Commercial Fuel Cmbs	343	412	494	593	712
Industrial Fuel Cmbs	3258	3910	4692	5630	6756
Total Fuel Cmbs	4152	4982	5978	7174	8609
Chemical Industry	3955	4746	5695	6834	8201
Food/Agric. Industry	65	78	94	113	136
Metallurgical Industry	14	17	20	24	29
Mineral Prod. Industry	126	151	181	217	260
Petrochemical Industry	73	88	106	127	152
Wood Processing Industry	1428	1714	2057	2468	2962
Other Industries	30099	36119	43343	52012	62414
Total Process Loss	35760	42912	51494	61793	74152
Incineration	189	56	67	80	96
Open Burning	4259	1791	2149	2579	3095
Wigwam Burners	836	0	0	0	0
Total Solid Waste	5284	1847	2216	2659	3191
Motor Vehicles	166400	20611	11032	15776	22560
Total Transportation	171227	26463	18054	24202	32671
Field Burning	6150	615	615	615	615
Forest Fires	1031	1031	1031	1031	1031
Slash Burning	5154	6185	7422	8906	10687
Total Miscellaneous	12335	7831	9068	10552	12333
Total Valley	228758	84035	86810	106380	130956

Projected Emissions for the Willamette Valley

Carbon Monoxide Emissions in tons/year

Source Category	1970	1980	1990	2000	2010
Residential Fuel Cmbs	558	670	804	965	1158
Commercial Fuel Cmbs	181	217	260	312	374
Industrial Fuel Cmbs	1582	1898	2278	2734	3281
Total Fuel Cmbs	2321	2785	3342	4010	4812
Chemical Industry	114	137	164	197	236
Food/Agric. Industry	69	83	100	120	144
Metallurgical Industry	4034	4841	5809	6971	8365
Mineral Prod. Industry	24	29	35	42	50
Petrochemical Industry	0	0	0	0	0
Wood Processing Industry	0	0	0	0	0
Other Industries	505	606	727	872	1046
Total Process Loss	4746	5696	6835	8202	9841
Incineration	439	129	155	186	223
Open Burning	13333	5607	6728	8074	9689
Wigwam Burners	13097	0	0	0	0
Total Solid Waste	26869	5736	6883	8260	9912
Motor Vehicles	816565	137738	65805	94102	134565
Total Transportation	824664	147457	77468	108098	151360
Field Burning	51772	5177	5177	5177	5177
Forest Fires	5497	5497	5497	5497	5497
Slash Burning	27532	33038	39646	47575	57090
Total Miscellaneous	85937	43712	50320	58249	67764
Total Valley	944537	205386	144848	186819	243689

Projected Emissions for the Willamette Valley

Particulate Emissions in tons/year

Source Category	1970	1980	1990	2000	2010
Residential Fuel Cmbs	954	1145	1374	1649	1979
Commercial Fuel Cmbs	1124	1349	1619	1943	2332
Industrial Fuel Cmbs	10187	6573	7888	9466	11359
Total Fuel Cmbs	12265	9067	10880	13056	15667
Chemical Industry	131	33	40	48	58
Food/Agric. Industry	3615	1202	1442	1730	2076
Metallurgical Industry	2196	1092	1310	1572	1886
Mineral Prod. Industry	3475	2255	2706	3247	3896
Petrochemical Industry	559	384	461	553	664
Wood Processing Industry	39657	6310	7572	9086	10903
Other Industries	239	221	265	318	382
Total Process Loss	49872	11497	13796	16555	19866
Incineration	316	93	112	134	161
Open Burning	3367	1416	1699	2039	2447
Wigwam Burners	3982	0	0	0	0
Total Solid Waste	7665	1509	1811	2173	2608
Motor Vehicles	3195	4569	6534	9344	13362
Total Transportation	4719	6398	8729	11978	16523
Field Burning	8200	2800	2800	2800	2800
Forest Fires	773	773	773	773	773
Slash Burning	3871	4645	5574	6689	8027
Total Miscellaneous	13666	8218	9147	10262	11600
Total Valley	88187	36689	44363	54024	66264

SOLID WASTE

- OR -

IS YOUR GARBAGE GOING TO BURY YOU?

PRESENT STATUS:

Land disposal is the principal method of solid waste disposal in the Willamette Basin. In 1970, there were 48 authorized disposal sites in the Basin, of which 5 were sanitary landfills, 27 were landfills and 16 were open dumps. Present regulations require phasing out of all open dumps and encourage the use of sanitary landfills.

Daily per capita generation of solid wastes has grown steadily over the past decades, reaching 5.3 pounds per day in 1970. The Basin population generated 3.9 thousand tons of waste per day in 1970, requiring 2.6 thousand acre/feet of landfill.

PROJECTIONS:

Projecting per capita solid waste generation trends, it appears that a minimum of eight pounds of waste per capita will be generated daily in the year 2000. This increase, coupled with population growth, will result in ten thousand tons of solid waste each day. The attached illustration graphically depicts this problem. If this waste is to be disposed in sanitary landfill, 12,800 acres of land will be required between now and the year 2000. The above figures do not include agricultural wastes and special wastes such as tires, sludges and hospital wastes. Requirements for disposal of these will add to the projected disposal requirements.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

There is a direct relationship between solid waste disposal and air and water quality programs. As regulations become stricter for air and water quality, wastes previously burned or disposed in rivers become a solid waste disposal problem. Open burning of solid wastes is being completely discontinued because of air pollution problems. The currently accepted method of disposal, sanitary landfills, can affect water quality through leaching action. This is particularly true in the Willamette Basin due to the Basin's high rainfall and soil characteristics.

In addition to the associated air and water quality problems, increasing population density will make less land available for landfill and will make it increasingly difficult to serve individuals at disposal sites. Also, there are not sufficient suitable sites for landfills within the Basin to accommodate the projected acreage requirements.

Alternatives to individual community landfills need to be developed to handle the increasing volume. Such alternatives could include recycling and high efficiency incineration.

PROJECTION ASSUMPTIONS:

1. Continuation of present trend of per capita generation.
2. No open burning permitted.
3. All wastes disposed by sanitary landfill.

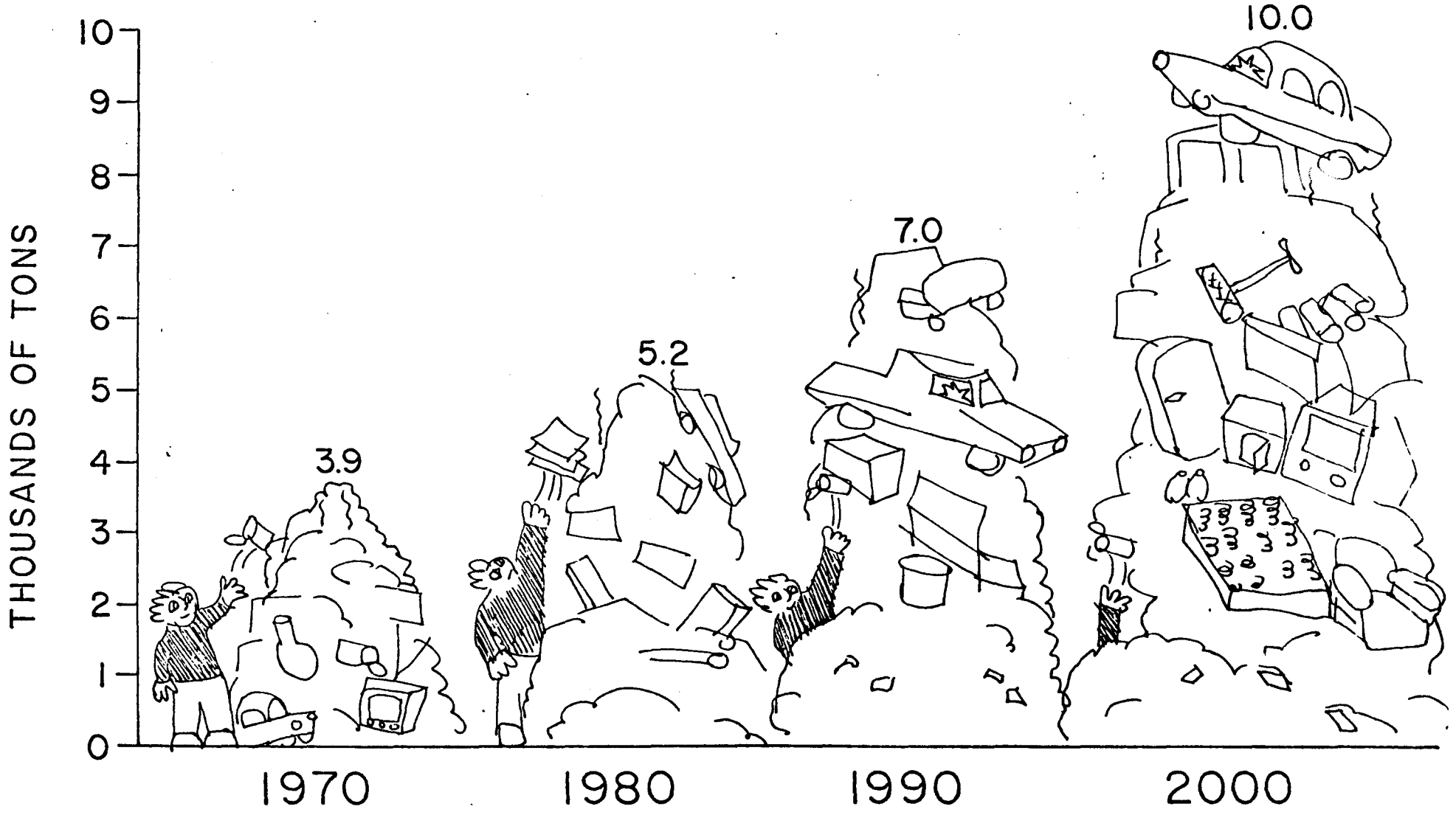
DATA SOURCES AND REFERENCES:

Oregon State Department of Environmental Quality

Advisory Committee on Environmental Science and Technology report "Environmental Quality in Oregon 1971"

Solid Waste Section, Oregon State Board of Health reports "Oregon Solid Waste Management, Status Report 1970" and "Industrial Solid Waste Survey, Oregon 1970"

SOLID WASTE – TOTAL DAILY TONNAGE



SOLID WASTE

ADDENDUM

TABLE I

SOLID WASTE GENERATION

	1970	1980	1990	2000	2010
Domestic - Commercial Lb/Cap./Day	4.0	4.5	5.0	6.0	7.0
Industrial Lb/Cap./Day	1.3	1.5	1.7	2.0	2.5
Total Daily Tonnage	3,900	5,200	7,000	10,000	14,700

TABLE II

DISPOSAL REQUIREMENTS

	1970	1980	1990	2000	2010
Landfill Required Acre-Feet/Year	2,600	3,500	4,700	6,600	9,800
Accumulated Acreage in Landfill (10' Average Depth)	--	3,050	7,150	12,800	21,000

WATER QUALITY

- OR -

CAN YOU SWIM IN THE WILLAMETTE RIVER?

PRESENT STATUS:

For many years Oregon has maintained a strong water pollution control program. Major progress has been made in the abatement of the Willamette Basin's primary water pollution problems. Only the Tualatin Basin still fails largely to meet established standards. All cities and communities who discharge wastes into the Basin's rivers have at least secondary treatment plants. By 1972 all industrial waste discharges to the Willamette River are scheduled to have year-around secondary treatment or equivalent control.

This control program has reduced biochemical oxygen demand (BOD) discharges into the Willamette main stem from a population equivalent of 2,000,000 in 1957 to 550,000 in 1970 and has increased low-flow dissolved oxygen (DO) levels in the lower river from 1.5 parts per million (ppm) to 5.0 ppm during the same period. This improvement in quality of the Willamette River is evidenced in recent years by the development of significant new salmon and steelhead runs in the River.

PROJECTIONS:

Both municipalities and industries in the Basin have been assigned essentially fixed limits of BOD discharges. Under existing regulations, additional waste loads resulting from future growth and development will have to be accompanied by increased efficiency of treatment, with no increases in waste loads discharged into the rivers.

If efficiency levels are not increased to meet growth, the progress made in the last decade in improving water quality will be completely wiped out by the year 2000. Projections of BOD discharges and dissolved oxygen levels that will occur if efficiency levels are not increased in the following table and in the attached illustration.

Year	Population Equivalent of sewage and waste loads (BOD) discharged to river system	General compliance with present water quality standards	Minimum dissolved oxygen in lower river (ppm)
1970	550,000	Yes	5
1980	629,000	Almost	4-1/2
1990	760,000	No	4
2000	891,000	No	3
2010	1,053,000	No	2-1/2

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

To maintain present water quality standards, treatment efficiencies must be increased significantly over today's levels. This will require tertiary treatment of most of the major discharges. This level of treatment is costly both to industries and to individual citizens. Taxpayers will be forced to weigh the desirability of continued quality water against its pocketbook cost.

Current BOD leading from irrigation runoff is not a significant factor in the Basin. If the increase in irrigation, as projected in other sections of this report, is not accompanied by sound land and water management practices, BOD leading from runoff could become a major problem in the basin. Water quality levels are dependent upon maintaining minimum stream flows. The maintenance of these flows will become more difficult in the future as competing consumptive use demands for irrigation, industrial and municipal use, etc., grow.

PROJECTION ASSUMPTIONS:

1. Continuation of existing methods of treatment and controls.

2. Continuation of existing compliance levels.

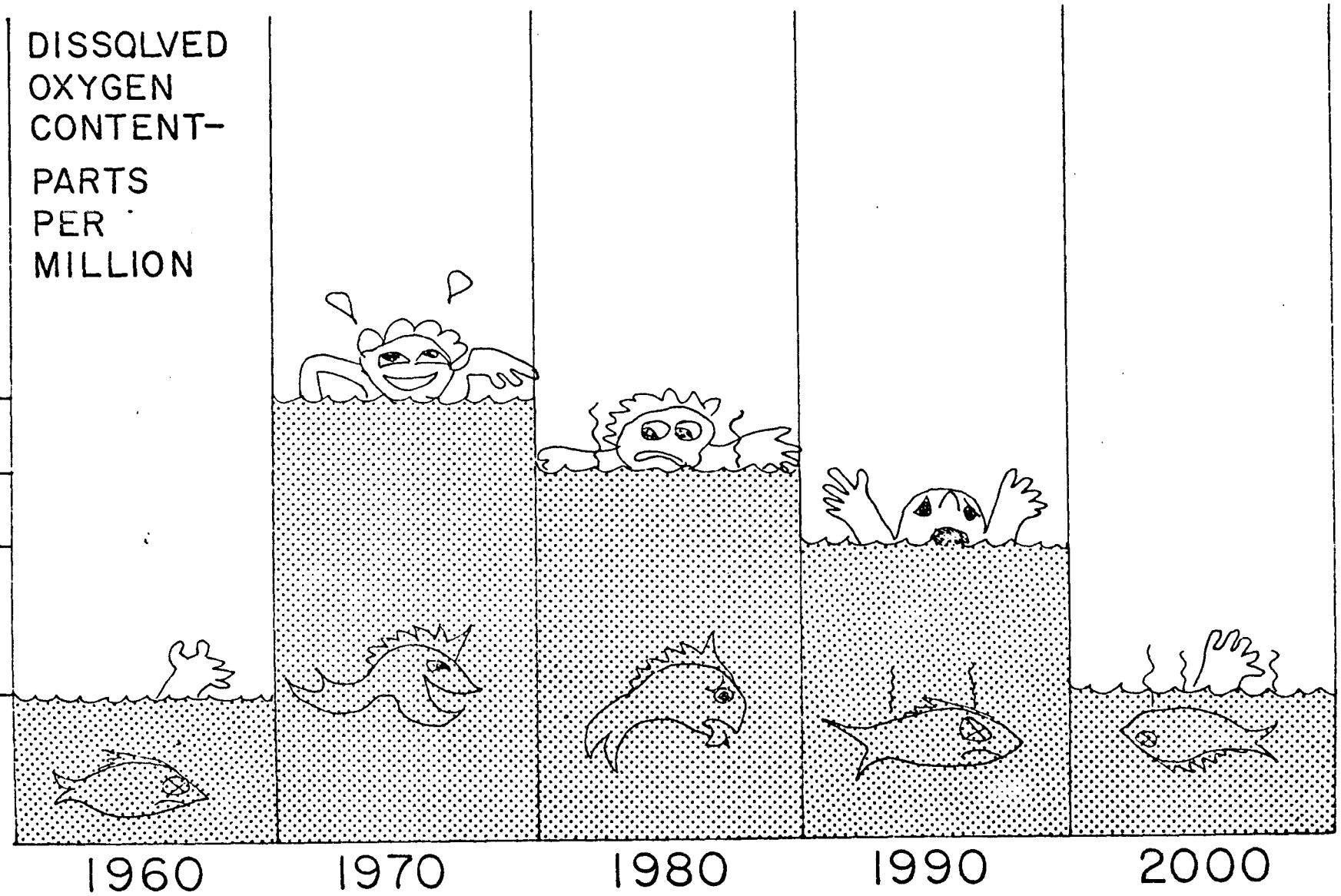
DATA SOURCES:

Oregon State Department of Environmental Quality

Department of Environmental Quality report "Water Quality in Oregon - December 1970"

Advisory Committee on Environmental Science and Technology report "Environmental Quality in Oregon 1971"

WATER QUALITY–KEY INDICATOR



WATER SUPPLY

-OR-

WHO TURNED OFF YOUR WATER?

PRESENT STATUS:

To the unknowing person, the Willamette Basin might be considered a water-rich area because the average annual runoff in area streams, including the Sandy River, totals more than 26 million acre-feet. The total annually available water resource of the Basin is generally in excess of present needs. Most of the precipitation, however, occurs in the winter months and in such amounts as to create marked excesses while, conversely, the high demand summer months experience deficiencies. If floods are to be abated and summer demands are to be met, winter flows must be stored for timely release.

The Basin also has a large volume of water in natural underground storage. The quantity of water available at various locations ranges from meager in parts of the Coast Range to plentiful in parts of the valley floor and the Cascade Range. There is annual recharge, principally from precipitation, but the total amount is not definitely known.

Oregon laws provide that "all water within the state from all sources of water supply belongs to the public" and define the beneficial uses to which such waters can be placed as domestic, municipal, irrigation, power development, industrial, mining, recreation, wildlife, fish life, and pollution abatement. The laws also provide a system for legal regulation of water resource development for both surface and ground waters.

This section deals with uses which are considered to be essentially consumptive, or out-of-stream, uses; other sections such as fish life and water quality deal with the essentially nonconsumptive, or instream, uses. Approximately 25 percent of the Basin's precipitation is consumed by uses of man and by natural processes, such as evapotranspiration by plants and evaporation from lakes and streams. The attached table shows the quantity of water presently diverted for beneficial use, a portion of which is not consumed and returns to ground or surface sources for potential reuse.

PROJECTIONS:

The attached table also shows projected 1980 water requirements (diversions). The 1980 estimates show significant increases in municipal, irrigation and industrial water requirements with irrigation requirements alone projected to almost reach the current total water diversions. It is noteworthy that the Basin's major metropolitan areas have sources of water which are considered adequate to meet their quantity requirements for the foreseeable future.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

With the potential for significant flood damages and with current demands utilizing most available surface water during low flow periods, it is apparent that meeting future needs will require additional storage of winter runoff and/or changes in water-use patterns and methods such as recycling wastewaters and obtaining greater irrigation system efficiencies. Failure to implement adequate water supply development or management programs obviously means that some identified water requirements will not be met. State law, however, specifies that "when proposed uses of water are in mutually exclusive conflict or when available supplies of water are insufficient for all who desire to use them, preference shall be given to human consumption purposes over all other uses and for livestock consumption, over any other use, and thereafter other beneficial uses in such order as may be in the public interest . . . ."

PROJECTION ASSUMPTIONS:

Used projections of Willamette Basin Study.

DATA SOURCES:

Oregon State Water Resources Board report "Willamette River Basin"

Pacific Northwest River Basins Commission - Willamette Basin Task Force report "Willamette Basin Comprehensive Study - Appendix M Plan Formulation"

WATER SUPPLY

ADDENDUM

TABLE I

ANNUAL DIVERSION

1000 ACRE-FEET

	Current			1980		
	Surface	Ground	Total	Surface	Ground	Total
Municipal	193	69	262	297	107	404
Industrial	115	108	223	133	126	259
Domestic	--	21	21	--	26	26
Irrigation	330	239	569[1/]	873	285	1,158
Total	638	437	1,075	1,303	544	1,847

1/ Based on 1965 data.

POWER

- OR -

WHEN WILL THE LIGHTS GO OUT?

PRESENT STATUS:

The Pacific Northwest and thus the Willamette Basin has experienced relatively low energy costs due to the area's tremendous potential for hydroelectric power generation. This potential, however, will be largely tapped upon completion of the projects currently authorized. As of the end of 1970, energy generation capacity in the Northwest was 22,298,000 kilowatts (kw). Projects under construction and authorized additions will increase this capacity to 37,887,000 kw.

Energy requirements for the Willamette Basin in 1965 were 13,618 millions of kilowatt hours (kwh) with a December peak demand of 2,655,000 kw.

PROJECTIONS:

The Pacific Northwest River Basins Commission, in its study of the Willamette Basin, estimates that annual energy requirements for the Basin will increase from 20,289 million kwh in 1970 to 250,000 million kwh in 2010, with peak power demand increasing from 3,952,000 kw to 50,200,000 kw during the same period. If these estimates prove correct, the Willamette Basin alone will require more than the existing and authorized generation capacity of the entire Pacific Northwest! This projected growth is shown in the attached illustration.

If energy consumption could be held to the 1965 per capita use level, requirements by 2010 would be 31,435 million kwh with a peak demand of 6,129,000 kw. This demand would still be over 2.3 times the 1965 demand.

By changing some of the Basin Commission's assumptions to a more conservative growth (assumptions outlined below), a middle ground estimate is realized. This middle projection shows an increase in annual requirements from 17,043 million kwh in 1970 to 91,964 million kwh in 2010. Peak demand would increase from 3,408,000 kw to 18,393,000 kw in the same period. While significantly lower than the Basin Commission estimate, this projection shows a Willamette Basin requirement of approximately one-half the total Pacific Northwest existing and authorized capacity. This compares to the approximate one-tenth now required.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

No matter which of the above projections is utilized, it is obvious that significant new sources of power will be required continuously over the next 40 years. Given present technology, it appears that considerable reliance will be placed on thermal generating, primarily nuclear, and on pumped storage hydroelectric sources. Development of these power sources will require careful planning and control to minimize potential environmental degradation and maximize possible beneficial side values.

PROJECTION ASSUMPTIONS:

For Basin Commission estimate:

1. 1965 actual as base year.
2. Population estimates per Basin Study (close to our benchmark projections).
3. Decreasing number of persons per domestic and commercial customer.
4. Approximately 400 kwh per year increase per domestic customer.
5. Continuation of early 60's annual increase per commercial customer.
6. Irrigation requirements double each 10 years.
7. Eight percent per year increase in industrial requirements.

For continuation of 1965 per capita level:

1. 1965 actual base year.
2. Population growth per mid-benchmark projection.

For middle estimate:

1. 1965 actual as base year.
2. Population growth per mid-benchmark projection.
3. Static level of number of persons per domestic and commercial customer.
4. 350 kwh per year increase (1960-65 exp.) per domestic customer.
5. 500 kwh per year increase (1/2 1960-65 exp.) per commercial customer.
6. Irrigation requirements double each 10 years.
7. Five percent per year increase in industrial requirements.

DATA SOURCES:

Oregon State Water Resources Board

Oregon State Engineer

Oregon Public Utilities Commissioner

Pacific Northwest River Basins Commission - Willamette Basin Task Force report "Willamette Basin Comprehensive Study - Appendix J Power"

Pacific Northwest River Basins Commission - Power Planning Committee report "Review of Power Planning in the Pacific Northwest 1970"

ELECTRIC ENERGY–PEAK POWER DEMANDS

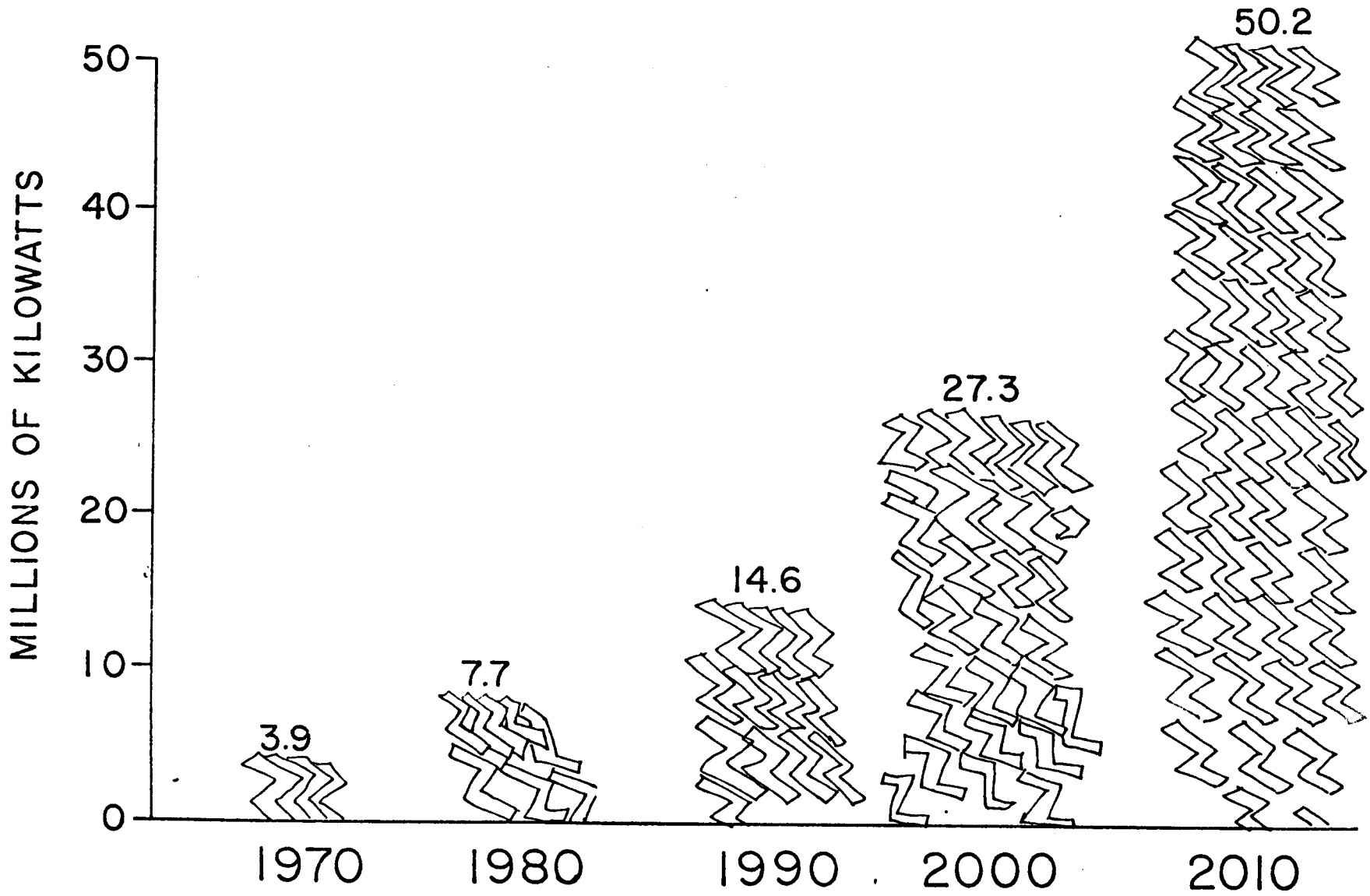


TABLE I

Estimated Peak Power Demand
(in 1,000 Kilowatts)

	Pacific NW River Basins Commission Estimate	Middle Estimate	Continuation of 1965 per capita use
1965	2,655	2,655	2,655
1970	3,952	3,408	2,925
1980	7,730	5,222	3,437
1990	14,600	7,965	4,129
2000	27,300	12,070	4,981
2010	50,200	18,393	6,129

TABLE II

Estimated Annual Energy Requirements
(in millions of Kilowatt hours)

	Basin Commission Estimate	Middle Estimate	Continuation of 1965 per capita use
1965	13,618	13,618	13,618
1970	20,289	17,043	15,000
1980	38,400	26,105	17,624
1990	72,700	39,827	21,173
2000	136,000	60,350	25,547
2010	250,000	91,964	31,435

TABLE III

Electrical Generation in Pacific Northwest
as of December 1, 1970
(in thousands of Kilowatts)

	Existing Capacity	Under Construction	Authorized Additions	Total
Federal Hydroelectric projects	9,609	4,373	6,685	20,667
Non-Federal Hydroelectric projects	11,394	501	--	11,895
Thermal-Electric Projects	1,295	4,030	--	5,325
Total	22,298	8,904	6,685	37,887

LANDS

- OR -

HOW CLOSE WILL YOUR NEIGHBOR BE?

PRESENT STATUS:

The Willamette Basin contains 7,709,000 acres of land surface. Approximately 59 percent of this acreage is privately owned and 38 percent is federally owned. The remaining 3 percent is owned by the state and local governments. The terrain of the Basin varies from flood plain valley floor to rocky mountain peaks. These lands have been inventoried as to soil associations, soil materials, soil aggregate, permeability, hydrology, suitability for cropland, generalized land capability, etc. This report will not attempt to present all the detail of these inventories. Generalized maps and summaries presenting these inventories can be found in the "Willamette Basin Comprehensive Study" of the Pacific Northwest River Basins Commission.

One of these inventories, i.e., Land Capability, however, merits mention here in that it combines many of the other factors to group lands as to their capability to produce common, cultivated crop and pasture plants. It is also a fact that generally the lands with a higher agricultural capability also are those that are least costly to develop for urban purposes. Land capability classes and estimated acreages in the Basin are outlined as follows:

Class	Summary Description	Basin Acreage (in 1,000's)
Class I	Few or no limitations or hazards.	171.5
Class II	Few limitations or hazards; simple conservation practices are needed when cultivated.	906.2
Class III	Have more limitations and hazards than Class II; require more difficult or complex conservation practices when cultivated.	851.9
Class IV	Have greater limitations and hazards than Class III; very difficult or complex measures are needed.	872.2
Class V-VIII	Land limited in use, generally not suited for cultivation.	4,800.8
	Total land area	7,602.6
	Water area	106.4
	Total Basin area	7,709.0

36.3 percent of the total Basin acreage is Classes I-IV with only 14 percent of the total Class I and II, i.e., those most suited for agriculture. Generally, Classes I-IV are located on the Valley floor and lower foothills and the other classes comprise the more hilly and mountainous areas.

Land use acreages within the Basin as of 1966 were as follows:

Dryland Crop	1,212,480
Irrigated Cropland	243,660
Total Cropland	1,456,140
Native Pasture	236,940
Woodland	5,100,970
Urban	331,530
Other	583,420
Total	7,709,000

Unfortunately, no detailed correlation between land use and land capability exists. It can be reasonably assumed, however, that the urban acreage generally lies in areas that also have a high suitability for agriculture.

PROJECTIONS:

The following table and attached graph show projections of land use acreage made in the Willamette Basin study of the Pacific Northwest River Basins Commission.

	ACRES		
	1980	2000	2020
Dryland crop	1,005,000	571,000	372,000
Irrigated cropland	430,000	850,000	1,000,000
Total cropland	1,435,000	1,421,000	1,372,000
Native pasture	202,000	156,000	113,000
Woodland	5,054,300	4,982,600	4,885,000
Urban	433,700	568,400	772,800
Other	584,000	581,000	566,200
Total	7,709,000	7,709,000	7,709,000

Again, for these projections no correlation has been made between land use and land capabilities.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

As shown in the foregoing projections, acreage required for urban purposes is projected to grow from 4.3 percent of total Basin acreage in 1966 to 10 percent in 2020. Urban acreage is shown to grow at the expense of all other uses. Competing demands for land between agriculture, urban, recreation and resource conservation will become more intense as population in the Basin grows.

For lands and their use, we have very detailed information. However, very little correlation of this information has been made upon which to base possible resolution of conflicts. A detailed inventory should be made which relates present and projected land use with land capability. This information is needed before we can begin to analyze potential impacts of urban growth in the Basin.

PROJECTION ASSUMPTIONS:

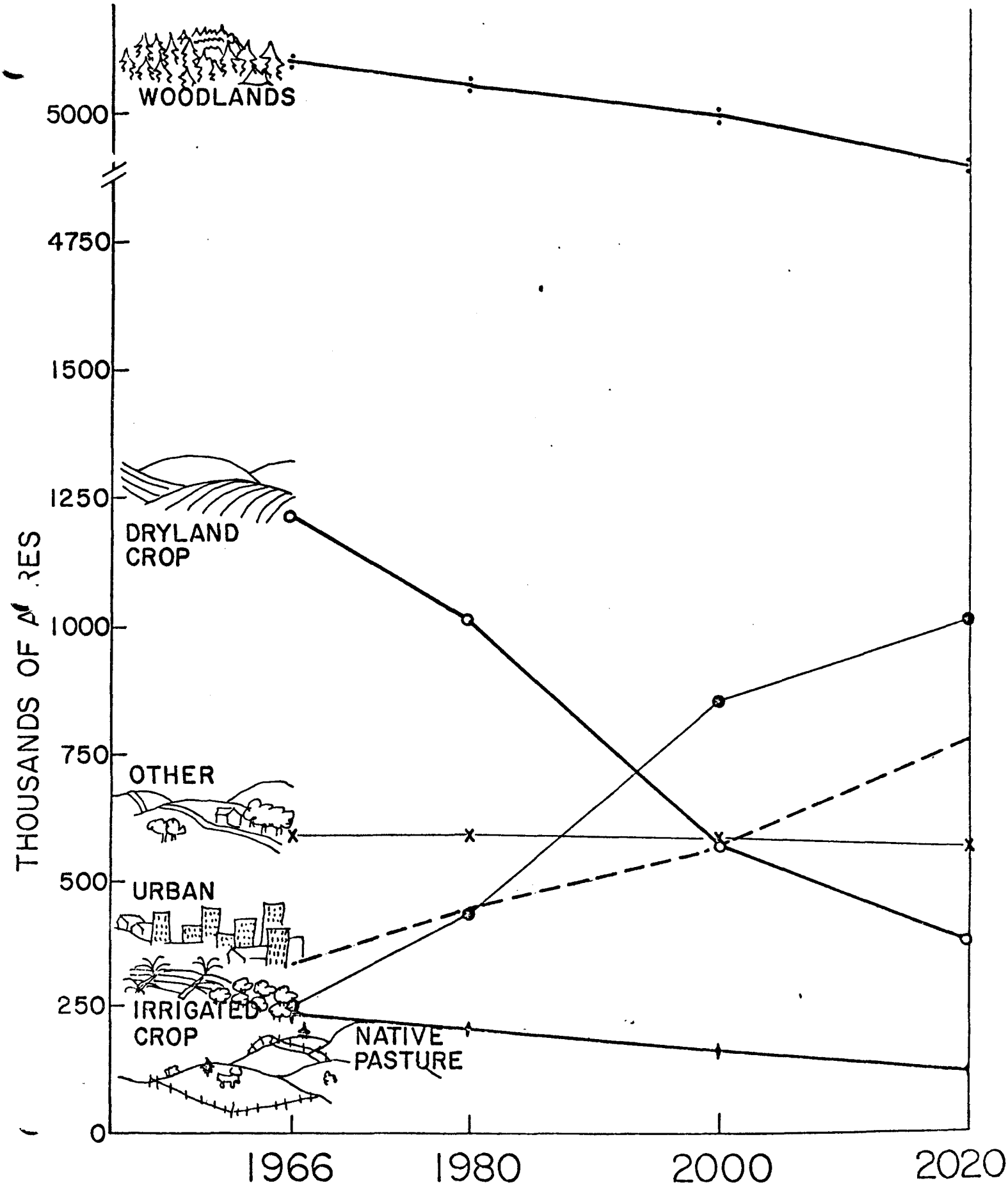
1. Used projection of Willamette Basin study.

2. Projections generally assumed continuation of past trends.

DATA SOURCE:

Pacific Northwest River Basins Commission - Willamette Basin Task Force report "Willamette Basin Comprehensive Study - Appendix G Land Measures and Watershed Protection"

LAND USE ACREAGES



GEOLOGY

- OR -

WHAT WILL YOU BUILD WITH?

PRESENT STATUS:

The primary geological resource of commercial value in the Willamette Basin is its sand and gravel resources. This resource is primary to the construction activities within the Basin. The current reserves of usable sand and gravel in the Willamette Valley are estimated at 76,000 acres. If a depth of 10 feet on an average is assumed, a total of 2.4 billion tons are available. These reserves are constantly being diminished by two factors: (1) urbanization, and (2) production.

PROJECTIONS:

Projecting current trends to the year 2000, a total of 21,782 acres of the reserves will be utilized through production, and an additional 28,710 acres will be lost through urbanization. These projections are shown graphically in the attached illustration.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

The combined effects of urbanization and production, if both pursue the courses projected, could result in the complete exhaustion of all known quality sand and gravel reserves in the Willamette Valley shortly after the year 2000. If the reserves are preserved from urbanization, this day of reckoning could be prolonged significantly. To do this would, however, conflict with other potential uses of the lands. This conflict would be transitory in nature in that the lands could be put to other uses once the sand and gravel reserve had been utilized.

All sand and gravel reserves cannot be eventually used for production. Certain upland deposits should be left undisturbed to protect supplies of groundwater necessary for domestic and agricultural purposes. Fish spawning and rearing areas depend upon stream sand and gravel deposits; and, therefore, these critical areas must be preserved if the fish resource is to be maintained.

The exact extent of the sand and gravel resources is not fully known. A study should be conducted in the near future to delineate the exact amounts and locations of these resources. Such a study will verify or modify the assumption as to the amount of reserves and will provide the information required to enact measures to preserve reserves where necessary.

PROJECTION ASSUMPTIONS:

1. 76,000 acres of reserves (educated "guesstimate" that needs to be verified through inventory study).

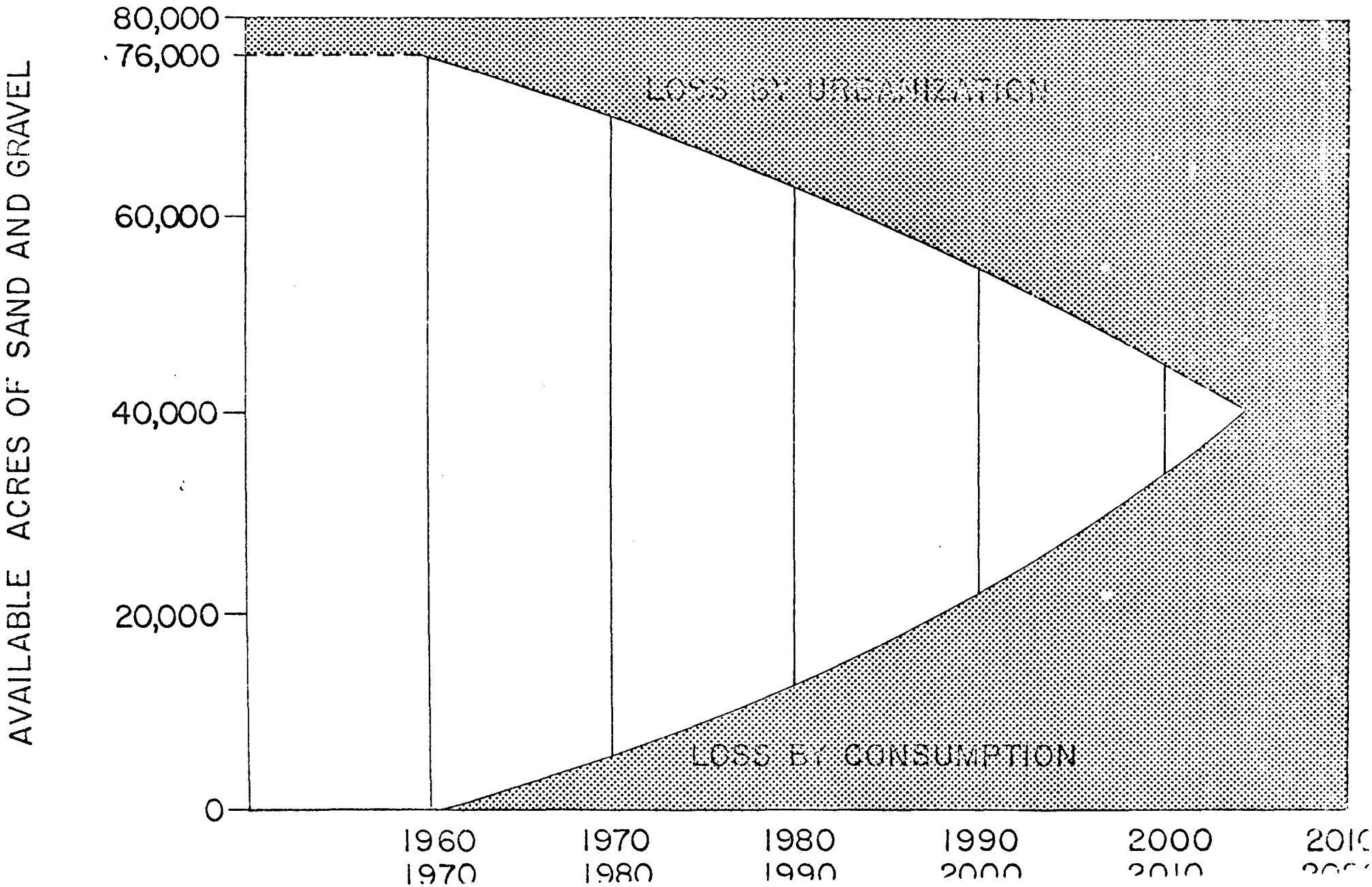
2. 10 feet average depth of deposits.

3. Per capita consumption at 12 tons per year.

DATA SOURCE:

Oregon State Department of Geology and Mineral Industries

PROJECTED LOSS OF SAND AND GRAVEL LANDS IN THE WILLAMETTE VALLEY BY URBANIZATION AND CONSUMPTION



ADDENDUM

Table I

Projected Production of Sand and Gravel in the Willamette Valley

Decade	Average Population	Factor*	Millions of Tons Consumed in Decade	Equivalent in Acres**	Cumulative Acres
1970-80	1,604,191	120	192	6,015	6,015
1980-90	1,907,560	120	229	7,153	13,168
1990-00	2,297,081	120	275	8,614	21,782
2000-10	2,801,568	120	336	10,505	32,287

* 12 tons per capita x 10 years (in decade) = 120.
** 43,560 x 10 ft. (deep) = 435,600 cu.ft./acre ÷ 27 = 16,000 cu.yds/acre.
= 32,000 tons/acre.

Table II

Projected Urbanization in the Willamette Valley

Decade	Acres Urbanized	Cumulative Acres
1970-80	7,410	7,410
1980-90	9,600	17,010
1990-00	11,700	28,710
2000-10	13,700	42,410

FOREST RESOURCES

- OR -

WHO WILL BE PROVIDING YOUR JOB?

PRESENT STATUS:

Of the 7.7 million acres in the Willamette Basin, 5.0 million acres, or approximately 65 percent, are commercial forest lands. These lands contain 146,117 million board feet of sawtimber. Over 10 percent of the nation's cut of softwood sawtimber comes from the Willamette Basin.

Forest products industries in the Basin consume approximately 5.0 million board feet annually. While the consumption level has remained fairly constant during the 1960's, average annual employment by the industry has declined from 39,200 in 1963 to 36,800 in 1970.

PROJECTIONS:

If the consumption level increases in the same proportion as the population increases, the annual consumption of timber would reach 8.5 million board feet by the year 2000, supporting a total industry employment of 62,600. Available timber supplies, however, are projected to support a consumption level of only 4.0 million board feet, or an employment level of 27,400 employes. This growing gap is depicted in the attached illustration.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

It is obvious from the above projections that the forest industry will not be able to carry the same proportion of employment as it has in the past. The availability of forest resources is thus a constraining factor on economic projections to be made by the Economic Policy Task Force. If the benchmark employment levels are to be realized, a shift in employment patterns will be necessary. This shift may be to other basic industry types or to a higher service to basic industry employment ratio. This shift will have impacts on air quality, water quality and population location depending upon the type and nature of industry or service employment that fills the employment gap.

The projection of available resources assumes no substantial loss in acreage of commercial forest land available for production. Competing demands from other areas, primarily recreational and preservation interests, may result in a decline in total acreage available. If this occurs, an even greater employment shift will be necessary.

PROJECTION ASSUMPTIONS:

For estimate that consumption level will increase with population:

1. Consumption will increase at same percentage rate as population using 1970 as base year.

2. Ratio of board feet consumed per employe will remain at 1970 level.

For estimate of level that can be supported by available resources:

1. Continuation at current trend of increasing level of forest management practices.

2. No substantial change in amount of commercial forest land available for timber production.

3. No change in current cutting rotation periods.

4. Continuation of current net log import/export level.

DATA SOURCES:

Oregon State Forestry Department

Pacific Northwest Forest and Range Experiment Station report and supplement "Prospective Timber Supplies and Forest Industrial Development in the Willamette River Basin"

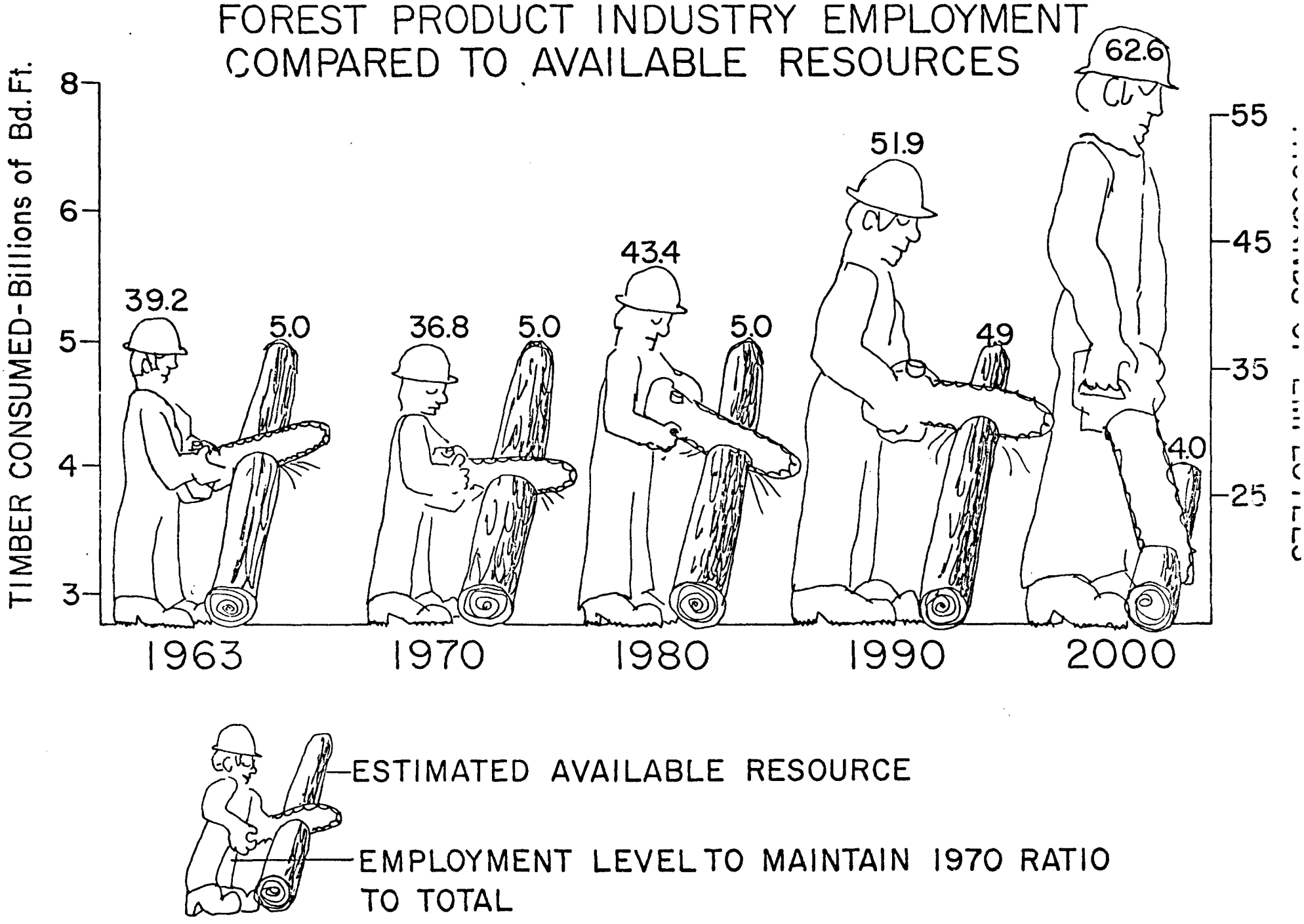

FOREST PRODUCT INDUSTRY EMPLOYMENT
COMPARED TO AVAILABLE RESOURCES
TIMBER CONSUMED-Billions of Bd.Ft.
8
6
5
4
3
55
45
35
25
39.2
5.0
36.8
5.0
43.4
5.0
51.9
4.9
62.6
4.0
1963
1970
1980
1990
2000
ESTIMATED AVAILABLE RESOURCE
EMPLOYMENT LEVEL TO MAINTAIN 1970 RATIO
TO TOTAL

Table I
Forest Product Consumption

	Level of consumption if 1970 level increases in proportion to population (In Millions of Bd. Ft.)	Level of consump. based on existing forest acres and distribution of age classes of timber (In Millions of Bd. Ft.)*	Deficiency (In Millions of Bd. Ft.)
1970	5,006	5,006	--
1980	5,907	5,041	866
1990	7,058	4,890	2,168
2000	8,510	4,040	4,470
2010	10,513	3,900	6,613

Table II
Forest Industry Employment

	Employment if level increased with population	Continuation of current trends*	Deficiency
1970	36,800	36,800	--
1980	43,400	34,900	8,500
1990	51,900	33,200	18,700
2000	62,600	27,400	35,200
2010	77,300	25,700	51,600

*Pacific Northwest Forest and Range Experiment Station Estimates

PARKS AND RECREATION

- OR -

HOW FAR DO YOU GO TO ESCAPE THE PRESSURE OF PEOPLE, PAVEMENT AND POLLUTION?

PRESENT STATUS:

Oregon and the Willamette Basin is blessed with tremendous opportunities for outdoor recreation. We have an excellent state park system and vast expanses of public land open for citizens to enjoy. Outdoor recreation for Basin residents is not confined to the Basin. Recreation areas on the coast and in Central and Eastern Oregon share with Basin facilities in meeting the recreational needs of the Willamette Basin.

Park lands are classed as to density of recreation provided and distance from population centers served. Definitions of classes and acreages of developed parks by class for 1970 are shown in the attached addendum. Standards have been developed by the State Park and Recreation Section for amounts of acreage per 1,000 population for each class of park lands. Generally, current acreages of park lands for Classes II-BC, III and IV, i.e., those more than 25 miles from urban centers exceed standards if outside Basin areas are included. Acreages for urban parks, however, do not currently meet established standards.

PROJECTIONS:

Projections of requirements by class of park land to maintain existing ratios of park acres/1,000 population and to meet "standard" ratios are attached. In summary, by the year 2010 over 42,000 acres, or double the current amount of developed park areas, will be required in the Basin to maintain existing ratios.

If developed park acres are not increased, the number of acres/1,000 population will decrease from the current 27.6 acres to 13.2 acres by 2010. Stated another way, the population per park acre will increase from 36 persons/acre to 76 persons/acre during this same period.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

With our wealth of public land, future non-urban recreation needs can be met. However, they will increasingly come into conflict with other uses of the land.

Meeting urban park needs will be more difficult. We are already below established standards for urban park areas per capita. With growing population, future park needs will be competing with other uses (industrial, residential and agriculture), thus making it increasingly difficult to satisfy these demands.

PROJECTION ASSUMPTIONS:

1. Acreage requirements to serve both residents and tourists assuming use by residents and tourists will remain in same proportion as current.

2. Acreage include only lands developed and used primarily for recreation.

3. Standards used are those developed for the year 1985 by the State Parks Section.

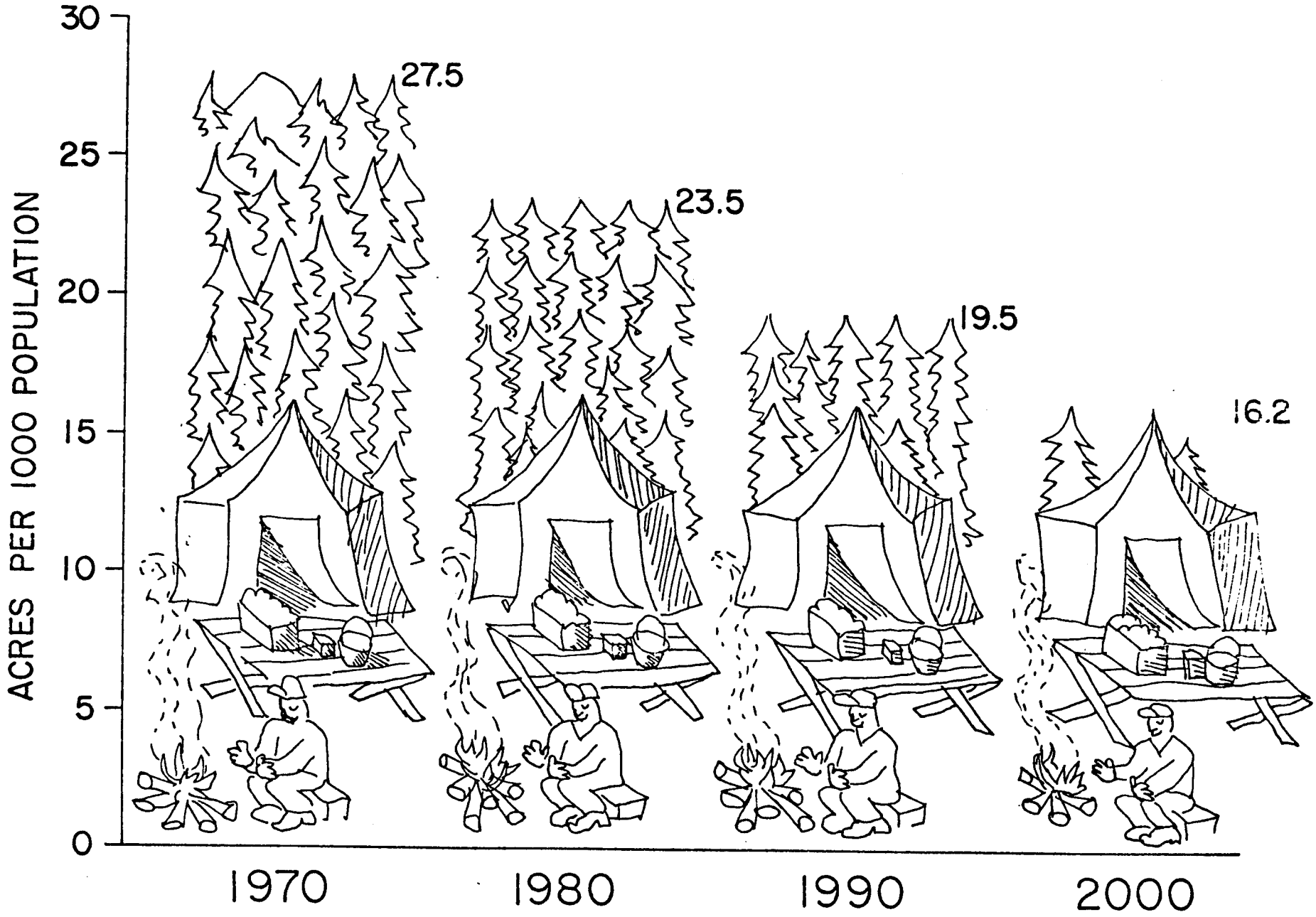
DATA SOURCES:

State Parks Section, Oregon State Highway Division

Oregon State Highway Division report "Oregon Outdoor Recreation"

Pacific Northwest River Basins Commission - Willamette Basin Task Force report "Willamette Basin Comprehensive Study - Appendix K Recreation"

TOTAL DEVELOPED PARK ACREAGE PER 1000 POPULATION (ASSUMING NO ADDITIONAL FACILITY DEVELOPMENT)



ADDENDUM

DEFINITION OF CLASSES OF PARK LANDS

Class I - High density recreation areas usually located within or near urban centers, primarily for intensive day use, but including specialized overnight facilities.

Class II-A - Generally developed recreation areas within 25 miles of communities of 10,000 or more; regional; for less intensive day, overnight and weekend use.

Class II-BC, III and IV - Class II areas more than 25 miles from population centers of 10,000 or more, areas in large natural environment with minimum development and areas in outstanding natural areas

TABLE I

PARK ACREAGE REQUIRED TO MAINTAIN
1970 RATIO OF ACRES/1000 POPULATION

	1970	1980	1990	2000	2010
Class I - No. of acres	4,550	5,370	6,430	7,735	9,485
- Additional required over 1970 acres	--	+820	+1,880	+3,185	+4,935
Class II-A					
- No. of acres	6,395	7,535	9,075	10,955	13,520
- Additional required over 1970 acres	--	+1,140	+2,680	+4,560	+7,125
Classes II-BC, III and IV					
- No. of acres	29,740	35,445	41,830	49,835	60,125
- Additional required over 1970 acres	--	+5,705	+12,090	+20,095	+30,385
Total - No. of acres	40,685	48,350	57,335	68,525	83,130
- Additional required over 1970 acres	--	+7,665	+16,650	+27,840	+42,445

TABLE II

PARK ACREAGE REQUIRED TO ACHIEVE
"1985 STANDARD" RATIO OF ACRES/1000 POPULATION

	1970	1980	1990	2000	2010
Class I - No. of acres required	16,135	22,510	31,170	42,560	58,495
- Additional required over 1970 actual acres	+11,585	+17,960	+26,620	+38,010	+53,945
Class II-A					
- No. of acres required	19,545	26,475	35,925	48,300	65,545
- Additional required over 1970 actual acres	+13,150	+20,080	+29,530	+41,905	+59,150
Classes II-BC, III and IV					
- No. of acres required	73,775	102,250	141,580	193,425	265,840
- Additional required over 1970 actual acres	+44,035	+72,510	+111,840	+163,685	+236,100
Total - No. of acres required	109,455	151,235	208,675	284,285	389,880
- Additional required over 1970 actual acres	+68,770	+110,550	+167,990	+243,600	+349,195

TABLE III

PARK ACRES PER 1000 POPULATION
IF NO INCREASE IN ACREAGE FROM 1970 AMOUNT

	Acres/1000 Population			
Year	Class I	Class II-A	Classes II-BC III & IV	All Classes
1970	3.1	4.3	20.2	27.6
1980	2.6	3.7	17.2	23.5
1990	2.2	3.1	14.3	19.5
2000	1.8	2.5	11.8	16.2
2010	1.5	2.1	9.6	13.2

TABLE IV

POPULATION PER PARK ACRE
IF NO INCREASE IN ACREAGE FROM 1970 AMOUNT

	Population/Park Acre			
	Class I	Class II-A	Classes II-BC, III & IV	All Classes
1970	325	231	50	36
1980	381	271	58	43
1990	458	326	70	51
2000	552	393	85	62
2010	679	483	104	76

TABLE V

RECREATIONAL FACILITIES REQUIRED
BASED UPON "1985 STANDARD"

Activity	Stand./1000	1970	1980	1990	2000	2010
Picnicking	9 sites	13,275	15,60	18,740	22,605	27,825
Camping	17 sites	25,080	29,460	35,395	42,705	52,545
Golfing	0.06 courses	90	105	125	151	185
Boating	0.2 launch lanes	295	348	417	503	618
Beach Area	0.3 acres	441	520	624	754	928
Water Surface	65 acres	95,905	112,640	135,340	163,275	200,925
Trails	2 miles	2,950	3,465	4,160	5,030	6,185
Winter Sports	3.8 acres	5,605	6,580	7,910	9,540	11,745
Scenic Roads	2.5 miles	3,695	4,335	5,210	6,280	7,725

FISH AND WILDLIFE

- OR -

HAVE YOU GOTTEN ANY LATELY?

PRESENT STATUS:

The use of the Willamette Basin's fish and wildlife resources through hunting, fishing and sightseeing provides one of the major leisure time activities for the Valley's residents. In 1970, 260,778 of the Basin's residents were licensed anglers and 222,840 held hunting licenses. These license holders enjoyed 2,347,000 recreational days of angling and 2,054,584 days of hunting. In addition, an estimated 1,300,000 recreational days were spent by residents in wildlife viewing (bird watching, etc.).

In 1970, the Basin produced a harvest of 9,705 big game, including deer, elk and bear; 103,950 upland game birds; 823,220 waterfowl; 122,620 doves and pigeons; and 6,780 squirrels to Basin hunters. The Basin provided during that year approximately 60 percent of the hunting activity for the Valley residents.

Approximately 70 percent of the angling time of Basin residents was spent in the Basin in 1970. Approximately 1,220,000 trout, 144,600 salmon and steelhead and 336,000 warm water fish were taken in the Basin.

PROJECTIONS:

The attached papers from the Game Commission project future demands and supplies for hunting and angling. In summary, the projections show an increasing pressure with total number of licensed anglers and hunters growing faster than population growth. The number of anglers is projected to increase at a much more rapid rate and hunters at about the same rate as population growth. By the year 2000 it is estimated there will be 359,050 hunters and 881,700 anglers among the Valley residents. This growth is shown in the attached illustration.

PRELIMINARY CONCLUSIONS AND POTENTIAL CONFLICTS:

Increasing competition from urbanization and intensified agriculture within the Basin will tend to reduce available habitat for game animals. With this competition, available game within the Basin will not keep pace with increased number of hunters, resulting in a lower success ratio and a shift of hunting pressures from the Basin to other areas of the state. Impacts by species of game are outlined in the attached paper.

Existing angling catch ratios, even with the increased numbers of anglers, can be maintained in future years. This can be accomplished, however, only if adequate habitat, such as water quality levels and minimum stream flows, can be maintained and if significant increases are made in hatchery production.

PROJECTION ASSUMPTION:

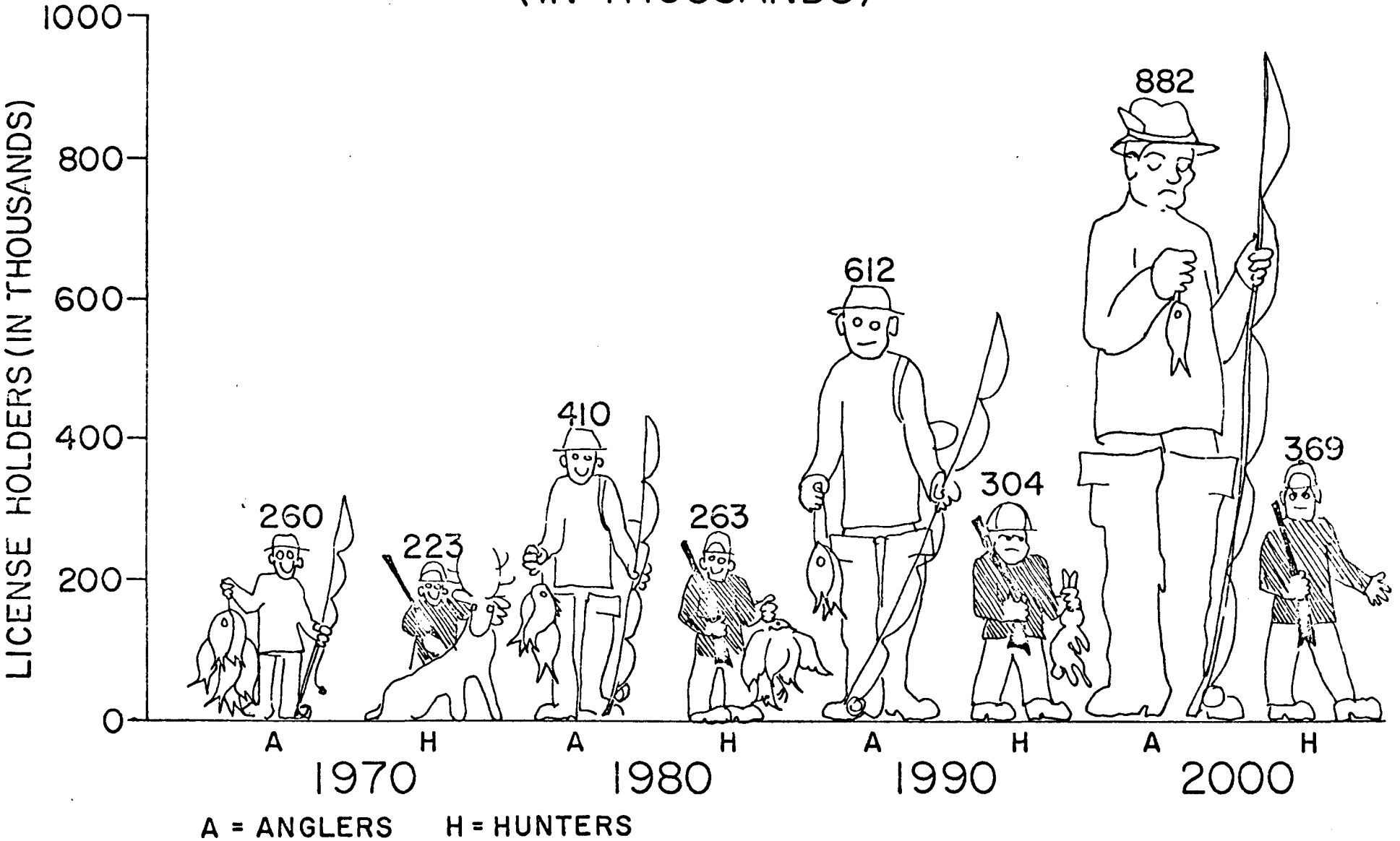
1. Specific assumptions as detailed in attached papers.

DATA SOURCES:

Oregon State Game Commission

Pacific Northwest River Basin Commission - Willamette Basin Task Force report "Willamette Basin Comprehensive Study - Appendix D Fish and Wildlife"

NUMBER OF ANGLERS AND HUNTERS AMONG BASIN RESIDENTS (IN THOUSANDS)



FISH AND WILDLIFE

ADDENDUM

10/20/71

WILLAMETTE BASIN
PROJECTED WILDLIFE USE

The following projection of wildlife use in the Willamette Basin is an updating of the data in the 1969 "Willamette Basin Comprehensive Study Water and Related Land Resources Appendix D." All calculations were expanded from 1970 base data.

In developing these projections the following points were considered.

1. The number of hunters in Oregon increased 18 percent from 1961-1970.

2. In 1970, an estimated 60 percent of the hunters residing in the Willamette Basin also hunted in the basin. However, because of changing land uses this percentage was reduced .125% annually.

3. During the 1970 season, hunters hunted an average of 9.22 days. Hunter demand was calculated by multiplying the number of hunters by 9.22 hunter-days.

4. Special consideration by species.

   (a) Deer: Hunter numbers and hunter-days are expected to increase. However, the number of deer harvested will remain static.

   (b) Elk: Hunter numbers, hunter days, and elk harvested should continue to increase. Elk numbers are increasing in the basin, particularly in logged lands on the Cascade Slope.

   (c) Bear: Interest in bear hunting will increase with increased hunter leisure time.

   (d) Pheasants: Pheasant numbers are declining throughout the basin and will continue to decline with the loss of habitat.

   (e) Quail: Quail populations are static but hunter use is expected to increase.

   (f) Grouse: This species has generally been under-harvested in the past and should provide for increased hunting in the future.

(g) Squirrels: Squirrel populations in the basin are not high but have received light hunting pressure in the past. Interest should increase.

(h) Mourning Doves: Interest in dove hunting will increase with more leisure time. Dove populations are expected to remain static, but are capable of sustaining a higher harvest rate.

(i) Band-Tailed Pigeons: Pigeon numbers are static. Hunter use will increase only slightly.

(j) Waterfowl: Hunting, harvest, and recreation days for waterfowl are at maximum levels. Private ownership of waterfowl hunting lands will limit future hunting opportunities.

(k) Other Wildlife Species: Because of future limited opportunities for hunting game species, interest will increase in hunting other wildlife species such as rabbits.

(l) Nonconsumptive Use: Interest in wildlife viewing will be a rapidly growing use in the future. Present and projected uses are estimates.

PROJECTED WILDLIFE USE
WILLAMETTE BASIN

	1970	1980	1990	2000	2010
WILLAMETTE BASIN HUNTER POPULATION					
Human Population	1,475,384	1,732,998	2,082,132	2,512,031	3,091,105
Hunting License Holders	222,840	262,950	304,280	359,050	423,680
No. Hunters Using Basin	132,311	154,500	175,000	202,000	233,000
DEMAND					
Hunter-Day Demand	2,054,584	2,424,400	2,805,500	3,310,500	3,906,300
Hunter-Day Supplies	1,226,868	1,424,300	1,613,200	1,862,100	2,148,500
DEER					
Hunters	28,953	60,000	63,600	67,400	71,500
Hunter-Days	170,581	300,000	381,600	404,500	428,860
Harvest	8,880	30,000	30,000	30,000	30,000
ELK					
Hunters	2,391	3,300	4,950	6,600	10,000
Hunter-Days	12,296	18,000	27,000	36,000	45,000
Harvest	325	500	750	1,000	1,250
BEAR					
Hunters	2,000	4,000	6,000	8,500	10,000
Hunter-Days	11,740	24,000	42,000	68,000	90,000
Harvest	500	750	1,000	1,200	1,200
PHEASANTS					
Hunters	31,680	31,500	30,000	30,000	30,000
Hunter-Days	139,930	140,000	145,000	148,000	150,000
Harvest	60,370	57,352	54,485	52,000	49,400

	1970	1980	1990	2000	2010
QUAIL					
Hunters	7,510	8,000	10,000	12,000	14,000
Hunter-Days	35,770	40,000	40,000	48,000	58,000
Harvest	25,810	30,000	35,000	40,000	45,000
GROUSE					
Hunters	6,200	8,000	10,000	15,000	20,000
Hunter-Days	23,330	25,000	28,000	31,000	35,000
Harvest	17,770	18,000	20,000	24,000	28,000
GRAY SQUIRRELS					
Hunters	1,610	2,000	4,000	6,000	8,000
Hunter-Days	9,710	16,000	32,000	48,000	72,000
Harvest	6,780	8,000	9,000	10,000	12,000
MOURNING DOVES					
Hunters	8,720	10,000	15,000	20,000	25,000
Hunter-Days	39,770	50,000	90,000	120,000	150,000
Harvest	81,110	84,000	86,000	90,000	93,000
BAND-TAILED PIGEONS					
Hunters	6,140	8,000	9,000	10,000	12,000
Hunter-Days	27,390	32,000	36,000	40,000	48,000
Harvest	41,510	44,000	47,000	50,000	50,000
WATERFOWL					
Hunters	68,597	70,000	71,000	73,000	74,000
Hunter-Days	726,351	728,000	740,000	750,000	780,000
Harvest	823,220	825,000	830,000	830,000	830,000
MISC. OTHER SPECIES					
Hunter Days	30,000	51,300	52,200	168,600	291,640
NON-CONSUMPTIVE					
Viewer-Days	1,300,000	2,000,000	3,000,000	4,500,000	6,750,000

MEMO

OREGON STATE GAME COMMISSION

To: Bob Stein

Date: October 27, 1971

From: Bob Sayre

Subject: Willamette Basin Sport Catch, Fish Supply, and Unsatisfied Catch Demand with New Population Estimates

Projections of angling in the Willamette Basin Study, Appendix-D, were based on the Basin population from 1965 estimates and on calculated increased fish production in the Basin.

The new population estimates are reduced by 0.020 percent in 1980 and increased 0.037 percent in and after 2000.

I have reduced sport catch demand and recreation, shown in Table III-2 Appendix D, by 0.020 percent for 1980 and 1990 and increased sport catch and recreation by 0.037 for 2000, 2010, and 2020.

Willamette Basin Human Population Projections
(Millions)

Estimate Year	Population 1980	1990	2000	2010	2020
1965	1,767	2,094	2,422	3,006	3,591
1971 /1	1,732	2,082	2,512	3,091	3,832

/1 The new 1980 estimate is a decrease of 0.020 percent compared to the estimate in Appendix C, Willamette Basin Comprehensive Study. The new 2000 estimate is an increase of 0.037 percent.

Willamette Basin Licensed Angler Projections
and Possible Recreation Days

	1970	1980	1990	2000	2010	2020
Anglers /1	260,778	410,500	612,100	881,700	1,261,000	1,781,000
Recreation Days /2	2,347,000	3,694,000	5,508,000	7,935,000	11,349,000	16,029,000

/1 In Willamette Basin, 18 percent of population was licensed in 1970. This is increased by 5.7 percent per 10-year period to coincide with statewide growth rate of anglers.

/2 The average resident angler fished nine days per year according to the 1965 survey.

Additional Sport Fishery Needs

According to estimated human population growth and growth rate of licensed anglers, insufficient numbers of fish will be produced in the Basin to satisfy angler demand.

	Needs			
	1980	1990	2000	2010
Fish				
Anadromous	171,000	269,000	378,000	435,000
Trout	844,000	902,000	2,014,000	2,807,000
Warm-Water Game Fish	342,000	519,000	696,000	855,000
TOTAL	1,357,000	1,690,000	3,088,000	4,097,000
Angler-Days				
Anadromous	990,000	1,557,000	2,189,000	2,519,000
Trout	337,000	361,000	806,000	1,123,000
Warm-Water Game Fish	114,000	173,000	232,000	285,000
TOTAL	441,000	1,091,000	3,227,000	3,927,000

The recreation listed in the above table can more nearly be realized by developing alternative fish production as listed beginning of page IV-2, Appendix-D, Willamette Basin Study. Also, much of the additional trout recreation will depend upon hatchery fingerling and legal production.

Willamette Basin Sport Catch Demand, Supply, and Unsatisfied Catch Demand (Thousands)

	Year				
Fish Type	1980	1990	2000	2010	2020
Demand - Fish					
Anadromous	380	530	694	751	819
Trout	2,744	2,802	3,914	4,707	5,700
Warm-Water Game Fish	882	1,059	1,236	1,395	1,555
Supply - Fish					
Anadromous	209	261	316	316	316
Trout	1,900	1,900	1,900	1,900	1,900
Warm-Water Game Fish	540	540	540	540	540
Unsatisfied Demand - Fish					
Anadromous	171	269	378	435	503
Trout	844	902	2,014	2,807	3,800
Warm-Water Game Fish	342	519	696	855	1,015

Willamette Basin Angler Days on Projected Catch Demand and Fish Supply
(Thousands)

Fish Type	Year 1980	1990	2000	2010	2020
Demand Angler-Days					
Anadromous	2,200	3,068	4,018	4,348	4,742
Trout	1,097	1,121	1,566	1,883	2,280
Warm-Water Game Fish	294	353	412	465	518
Supply Angler-Days					
Anadromous	1,210	1,511	1,829	1,829	1,829
Trout	760	760	760	760	760
Warm-Water Game Fish	180	180	180	180	180
Unsatisfied Angler-Days					
Anadromous	990	1,557	2,189	2,519	2,913
Trout	337	361	806	1,123	1,520
Warm-Water Game Fish	114	173	232	285	338

TRANSPORTATION ELEMENT

I. INTRODUCTION

A. Purpose

The primary purpose of the first phase of the Willamette Valley Process was to develop a preliminary overview of the Valley in the broadest possible context. The Transportation Task Force's state participants and the Port of Portland were given the assignment of preparing a generalized overview of the present and, given possible population and developmental trends, the future transportation system needed to service the mobility requirements of the Valley's industry and people. The projected transportation system was essentially forecast on the basis of meeting future mobility requirements with a system similar to that presently in use.

B. General Nature of Information

It was purposely the intent of the Willamette Valley coordinating group and the task force to develop and, when necessary, estimate general transportation information on a Valley-wide basis and not become "bogged" down in an in-depth data collection and analysis during the initial phases of the program. The information collected was only partially intended to demonstrate the need of future transportation requirements which would continue to enable Valley citizens and others to have easy access to work, school, the beach, medical facilities and other amenities and for the Valley's industries to bring in raw material for processing and to ship products to market. It was also intended to provide some very preliminary information identifying the broad interrelationships of transportation to the economic and natural resource task force findings.

The information and estimates developed during the first phase were restricted to aviation, highways and roads, public bus transportation and maritime facilities.

II. AVIATION

A. Present

There are 43 public-use airports in operation in the

Valley. They occupy approximately 8,500 acres of the Valley's 7.7 million acres[1] of land and water. The airport facilities range in sophistication from Portland International Airport to a short gravel strip located at Santiam Junction. Generally, the Valley's airports can be classified into three distinct groups:

1. airline airports;

2. general aviation, all-purpose airports; and

3. general aviation airports basically used for recreation access, forestry and emergency purposes.

The Valley's four air carrier airports - Portland, Salem (McNary), Corvallis and Eugene (Mahlon-Sweet) - had a total passenger enplanement in 1970 of 1,352,000. Over 92 percent of these departing passengers used Portland International. Total air cargo transportation in 1970 was about 46,000 tons.

In 1970, there were about 910,000 general aviation operations at Valley airports. (An operation is defined as either a landing or a take-off.) Approximately 1400 general aviation aircraft were based at Valley airports. An additional 200 or so general aviation aircraft are based at private facilities throughout the Valley. The capacity of the existing public-use airports is estimated at 3.8 million annual operations. This capacity is based upon an assumption that departing aircraft would not have to experience average delays of more than two minutes. During peak operations, delays may be more substantial.

It is important to point out that much of the present excess capacity that has been identified is located in places in the Valley where there will be no large increase in future demand. The converse is also true that some facilities in high growth areas are even now approaching operational saturation. In effect, what we see is large amounts of capacity located in the wrong places in regard to future growth. It will be left to the planning program now underway by the State Board of Aeronautics to recommend future state action to reconcile future demand and capacity.

Previous surveys indicate that approximately 35% of the general aviation trips are fully or partly for some

(1) Willamette Drainage Basin.

business purpose. A majority or nearly 70% of the business related general aviation trips appear to be for business travel and the remainder of the trips are for crop dusting and spraying, re-forestation, air taxi and flight instruction.

B. Projection on Current Trends

Air carrier passenger travel is projected to grow at a rapid rate. The number of departing passengers are expected to increase as follows:

1970 -- 1,352,000
1980 -- 3,354,000
2000 -- 13,415,000

Air carrier operations will increase substantially by 2000 indicating the need to expand capacity at least at Portland, Salem and Eugene. Present planning for Portland International Airport anticipates an annual capacity of 12 to 15 million departing passengers a year. Related surface transportation facilities will have to be expanded to provide adequate access to and from the airport facilities.

If general aviation continues to grow as in the past, the annual operations will increase as follows:

1970 -- 10,000
1980 -- 1,481,000
2000 -- 4,593,000

Aircraft based at Valley facilities are projected as follows:

1970 -- 1,600
1980 -- 2,640
2000 -- 8,200

In a recent National Transportation Needs Study, an additional 23 airports were identified as required by 1990. The Federal Aviation Administration's National Airport Plan (1968) states that five new airport facilities are needed in the Valley by 1973. (Lebanon, Portland East, Portland West, Springfield and Sweet Home)

If the entire 23 facilities were constructed and none of the existing facilities were closed, an additional 1,700 acres of valley land would be required for

airport purposes by 2000, making a total of 10,200 acres for this purpose.

C. Preliminary Conclusions

Air carrier passenger activity is projected to be the fastest growing segment of aviation in the Valley. Departing passengers per Valley population will rise from about one departure per person in 1970 to about five per person in the year 2000.

If general aviation activity continues to grow as roughly forecast and none of the existing public-use facilities were closed, there will be sufficient gross airport capacity to accommodate it in the existing system to 1995. However, much of the existing system is not located in areas of high future demand. It is also assumed that some of the existing facilities will be removed from the system and replaced by some of the 23 anticipated airports because of conflicts with urban uses and activities, higher property taxes on public-use, private-owned facilities, and because of limited potential to expand to handle future traffic volumes.

D. Assumptions

1. The forecasts of enplaned passengers were prepared from Port of Portland and Lane Council of Governments' data. Figures were adjusted for population growth, etc.

2. The growth of general aviation is based on a compounded growth rate of 5.82 percent per year. This growth rate is representative of the historical experience in the Portland and Eugene areas. (Operations are assumed to remain constant per based aircraft over the 30-year period.)

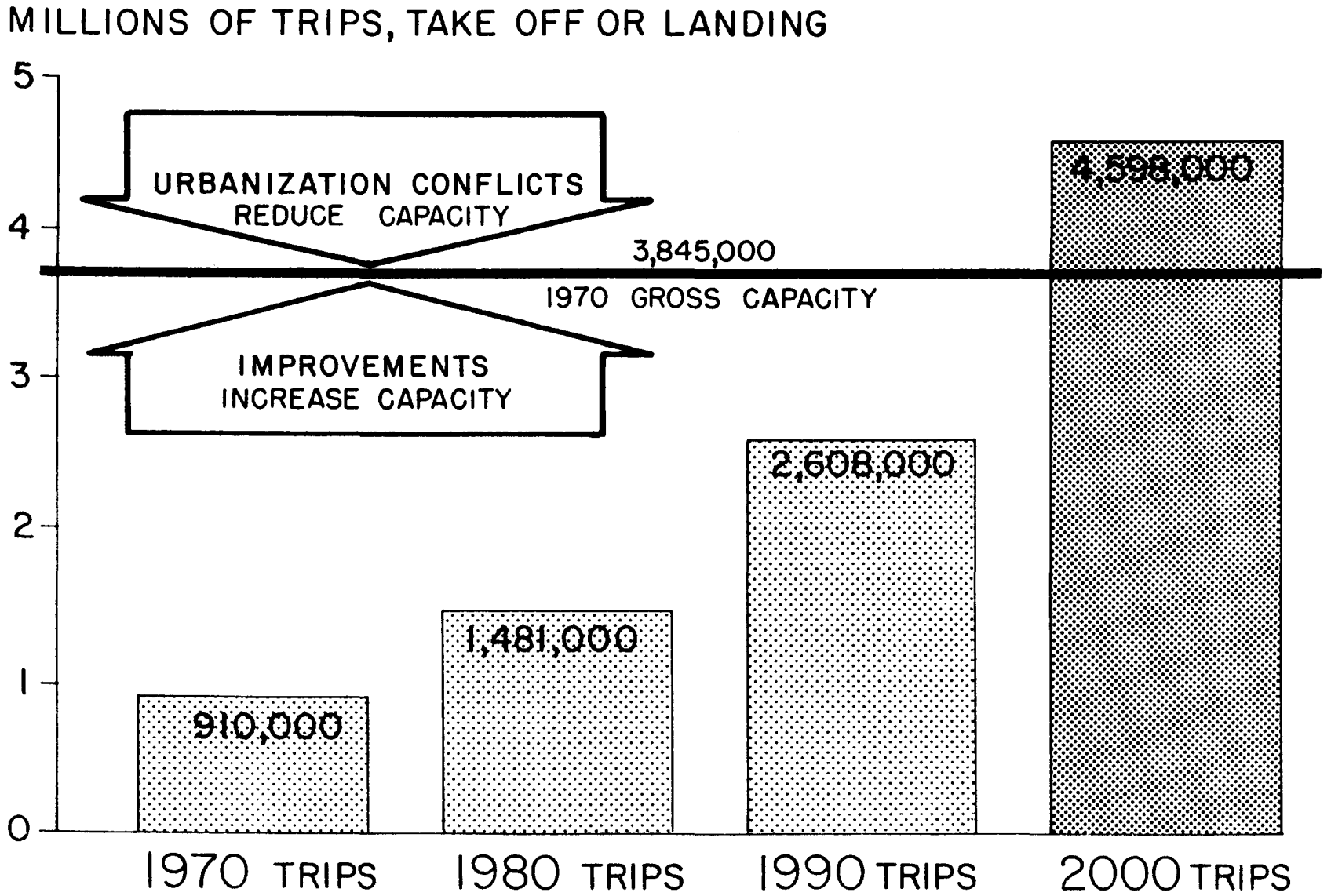
3. The 210 aircraft based at non-public-use airports were developed from data gathered in the Portland SMSA.

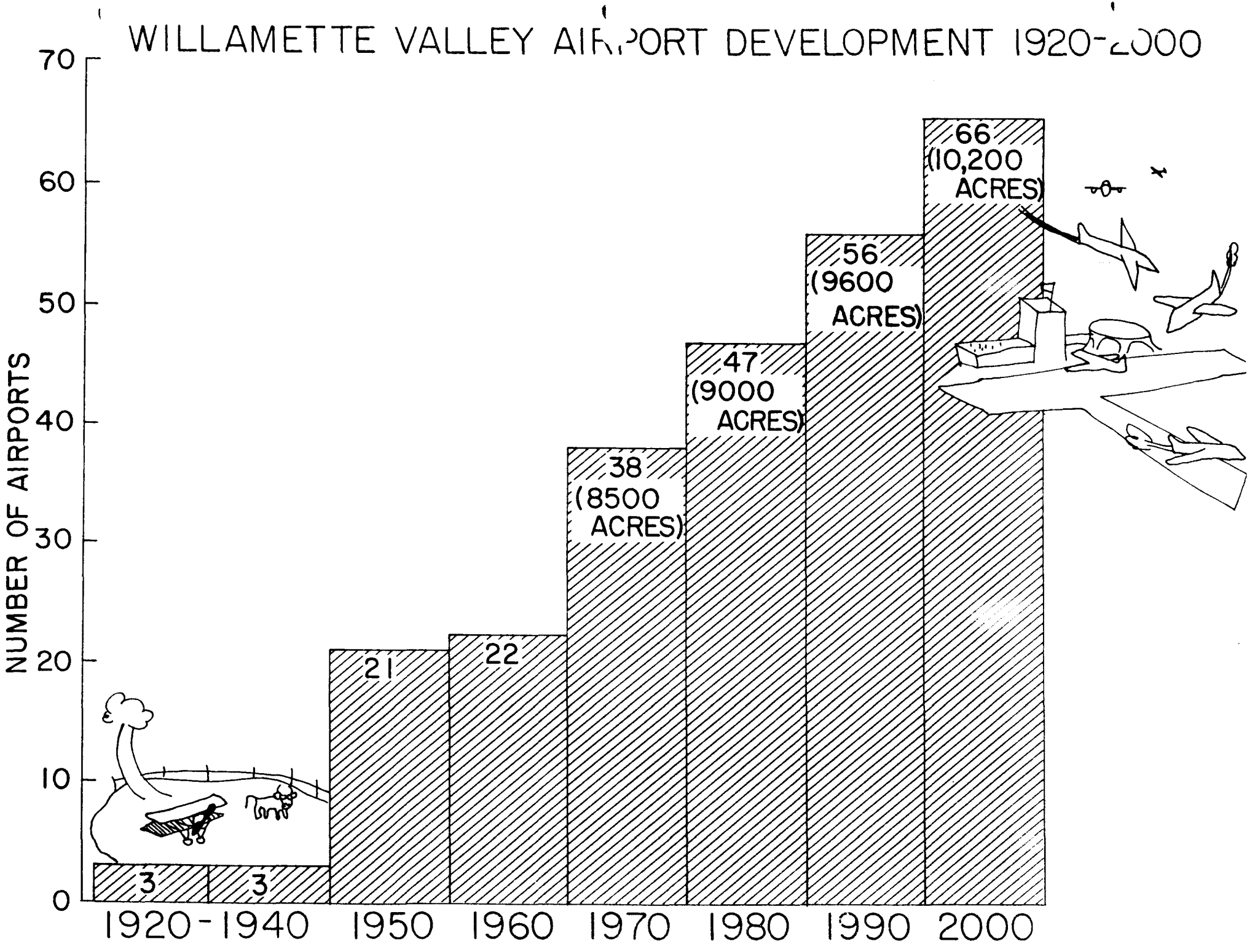
E. Sources

1. Master Plan Report prepared for Port of Portland by Burns and McDonnell, 1970.

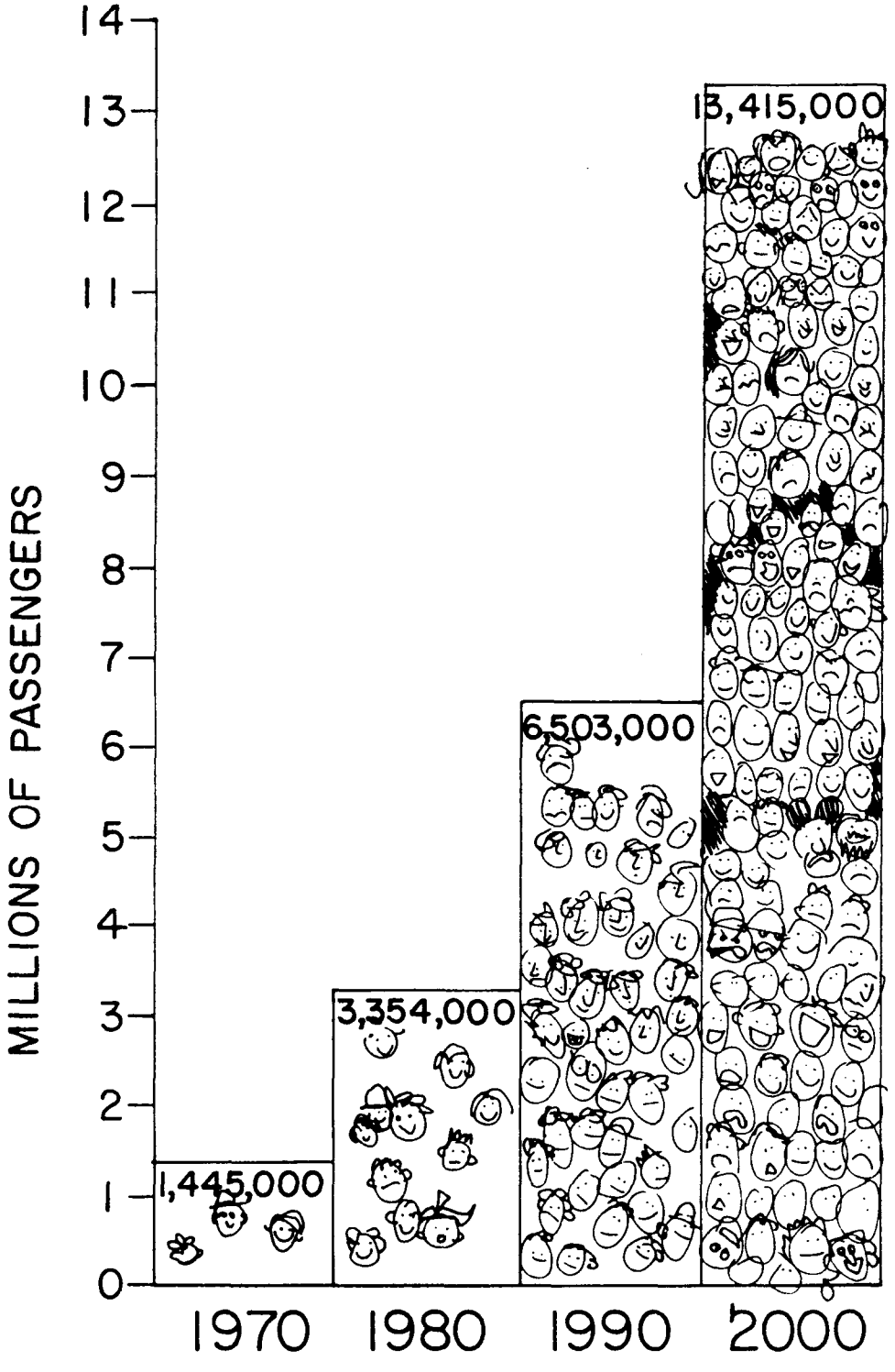
2. Individual Airport Data Sheets, (FAA Form 5010-1, various dates).

WILLAMETTE VALLEY GENERAL AVIATION CAPACITY AND PROJECTED USE 1970-2000




WILLAMETTE VALLEY AIRPORT DEVELOPMENT 1920-2000
NUMBER OF AIRPORTS
70
60
50
40
30
20
10
0
3
3
21
22
38
(8500 ACRES)
47
(9000 ACRES)
56
(9600 ACRES)
66
(10,200 ACRES)
1920-1940
1950
1960
1970
1980
1990
2000

WILLAMETTE VALLEY ENPLANED PASSENGER GROWTH 1970 —2000



3. Airport Needs Study for Lane County, Oregon, L-COG, 1971.

4. Portland Regional Airport Study, The Port of Portland, 1971.

5. 1968 National Airport Plan, FAA, 1968

6. National Transportation Planning Study (Preliminary data).

7. Evaluating the Benefits and Costs of the Oregon State Airport System: A Feasibility Study, prepared for the Oregon State Board of Aeronautics by College of Business Administration, University of Oregon.

III. ROADS, STREETS AND HIGHWAYS

A. Present - the Valley

In order to serve the many and diverse needs of the residents of the Willamette Valley, a very extensive and complex system of streets and highways are required. Because the people of Oregon generally choose to live in single-family dwelling units on rather large lots in the suburbs, a network of streets have evolved that provide direct service for these people. This is demonstrated by examining the total amount of land area that is utilized for facilities primarily serving property adjacent to the roadway.

In the Willamette Valley in 1970, there were 23,828 miles of roads and streets maintained by the state, counties and cities. The total right-of-way for these roadways occupies approximately 182,356 acres of land. Nearly 79% of this land represents area needed for local roads and collector streets primarily serving property next to the roadway itself. (It should be noted that approximately one-third or 54,786 acres /7,072 miles/ of this area are for Bureau of Land Management roads which generally do not serve residential property.) The balance of the land is used for arterials and state highways.

The 182,356 acres of land utilized by all types of streets and highways occupy slightly over 2% of the total land area in the Valley.

Over 22.5 million miles are driven daily over the Valley streets and highways. Around 90% of these are driven by the Valley residents to serve their needs

in automobiles. The remaining 10% are made by trucks serving the industries and businesses in the Valley.

B. Present - Urban Areas

The urban areas (5,000 or more population) in the Valley contain approximately 19% of all the road and street mileage. This represents approximately 5,000 miles. Although the urban areas contain only 19% of the total mileage, the increased activity brought about by urban living results in 60% of all miles traveled daily in the Valley.

An indication of just how many miles of the street and highway system are used to serve land development in an urban area is shown by comparing the amount of travel on the local and collector system. The accompanying chart shows that 80% of all the road and street mileage is in the local and collector categories. On this portion of the total system, only 26% of the total daily miles are traveled. Arterials and state highways (the remaining 20%) carry the other 74% of the miles traveled.

Over 25% of the six million miles being driven daily on state highways within urban areas are being driven on roads which currently have traffic volumes in excess of their design capacities. This results in delays and stop and go traffic in the more congested areas.

C. Present - Rural Areas

The state highways carry the bulk of the traffic in the rural areas of the Valley. The state highway system represents about 8½% of the rural system mileage, but handles 65% of the daily miles traveled in the rural area. The remaining 35% of the travel is carried out on the non-highway portion of the system. These figures should be tempered somewhat, however, because of the effect that the BLM mileage has on the rural system. Without the BLM roads, 65% of the travel is on 13.5% (state highways) of the remaining system.

D. Projection on Current Trends - The Valley

With the increase in population an even greater increase in automobile useage can be expected. This increase will result from Valley residents becoming

more affluent with shorter working hours and more vacation time. It is estimated that the number of miles traveled per person annually in the Valley will be:

1970 -- 5,592 miles
1980 -- 6,800 miles
2000 -- 9,000 miles

Although this increase seems to be excessive, it parallels the anticipated increase in spendable income. Since the projections reflect the "business as usual" procedures which were utilized throughout this study, these increases are realistic.

It is anticipated that by

1980	2000	there will be:
32,340,000	62,407,000	miles traveled daily on the Valley road and street system
27,145	33,754	Total miles of road
29,488	58,971	Additional acres

Thus, by the year 2000, 3.5% of the total area of the Valley will be used for providing roads.

Although the mileage of the total system increases 14% by 1980 and 42% by the year 2000, the volume of traffic carried daily increases from 22.5 million miles traveled in 1970 to 32.3 million in 1980 and to over 62.3 million miles traveled by the year 2000. This represents an increase in travel of 43% between 1970 and 1980 and a 176% increase between 1970 and the year 2000.

E. Projections on Current Trends - Urban Areas

Most of the growth in population will be absorbed in the urban portions of the Valley. This will require increased housing developments and more industrial development. This, in turn, will require additional roads, but most of the new roads will be to serve as access to developments and not trips by automobiles.

For example in:

1980	2000	
1061 - 100%	2,067	Miles of new urban street of all types.
760 - 72%	1,523 - 74%	Miles of local & collector streets, % of total.
301 - 28%	544 - 26%	Miles of arterials and highways, % of total.
19%	14%	% traveled on local and collector street system of all urban area miles.

Again, the bulk of the travel will occur on only a quarter of the roads.

F. Projections on Current Trends - Rural Area

The mileage increase in local and collector roads will be 2,294 miles from 1970 to 1980 and 4,594 miles from 1980 to 2000. No increase in miles of arterials and highways is anticipated since the expansion of the urban area boundary will reduce total rural miles and relatively few of the new road miles will be classified as arterials or highways.

The relationships between miles traveled and the classification of the road (local, collector, etc.) will remain about the same for all three time periods.

G. Alternate Projection

The foregoing forecasts are based on the assumption that highways and roads will continue to be built to meet the demand in the same manner as they are today. What if the assumption were made that there would be no additional improvements to handle the increased demand? The attached chart summarizes this condition. It shows that if no improvements are made, 80% of the 360 miles of state highway system in the urban areas will be on highways with traffic volumes in excess of their design capacity. 48% of the rural state highway system will be similarly overloaded, creating a high level of congestion throughout the Valley.

H. Preliminary Conclusions

A study of the following tables shows a sharp increase in vehicle miles of travel over the thirty-year period for the ten Willamette Valley counties. This rise in vehicle miles of travel is not only the result of the rapid increase in population, but also of higher annual miles of travel per person due to more money, free time and increased recreational travel. Although the increase in vehicle miles of travel in the year 2000 is forecast to be nearly three times the present, the miles of highway and acres of land projected to meet this demand is increased by 50% (most in BLM roads).

If no improvements were made on the state highway system to the year 2000, fewer trips would be made on the highway system since travel time would be increased due to congestion. The excess of demand will shift to the local street system until it also is congested. As a result, annual miles per person will decrease. However, the time allocated for travel in the year 2000 without improvements is the same with an improved system. The motorist would make shorter or fewer trips. If people make shorter trips, where they are"going to" must be adjusted. A significant change in the mobility patterns of the residents of the Valley brought about by the transportation system will result in altogether different land development patterns for different transportation systems.

I. Assumptions

1. Population projection was based on Willamette Valley Task Force population forecast.

2. Travel per person was based on historical trend analysis.

3. Land area was calculated from pavement and shoulder width, plus a reasonable distance times miles of roadway for each functional classified system.

4. Projected vehicle-miles of travel on the state highway system was developed from present traffic and normal growth with no improvement in highway network.

J. Sources

Highway Division

APPENDIX I

ESTIMATED MILEAGE AND RIGHT-OF-WAY ACRES FOR TEN WILLAMETTE VALLEY COUNTIES (ROADS NOT GRADED OR SURFACED NOT INCLUDED)

		Interstate	Other Princ. Arterial	Minor Arterial	Collector	Local	Total
				YEAR 1970			
TOTALS	Length - Miles	189	903	2,072	3,063	17,601	23,828
	Area - Acres	7,304	12,485	19,401	23,381	119,785	182,356
				YEAR 1980			
TOTALS	Length - Miles	216	1,002	2,209	3,618	20,100	27,145
	Area - Acres	7,900	14,842	22,315	27,796	138,991	211,844
				YEAR 2000			
TOTALS	Length - Miles	230	1,202	2,487	4,728	25,107	33,754
	Area - Acres	9,092	19,550	28,145	36,629	177,399	270,815

APPENDIX II

MILEAGE AND TRAVEL FOR TEN WILLAMETTE VALLEY COUNTIES

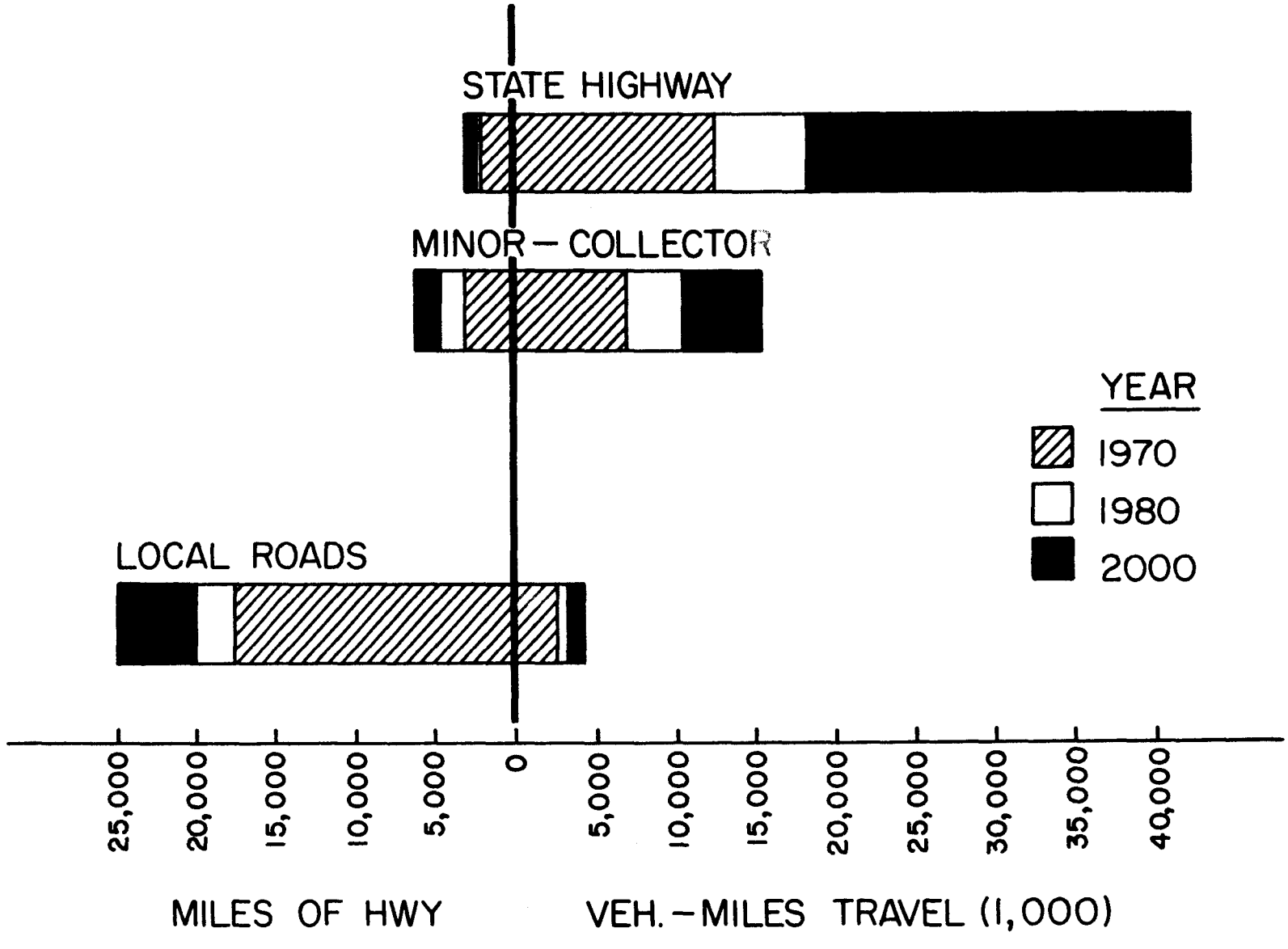
	Interstate		Princ. Arterial		Minor Arterial		Collector		Local		Total	
	Miles of Road	1,000 Daily Veh. Miles	Miles of Road	1,000 Daily Veh. Miles	Miles of Road	1,000 Daily Veh. Miles	Miles of Road	1,000 Daily Veh. Miles	Miles of Road	1,000 Daily Veh. Miles	Miles of Road	1,000 Daily Veh. Miles
1970												
Urbanized Area	50	1,938	270	4,368	526	3,321	302	1,055	3,133	1,825	4,280	12,507
Urban 5,000-50,000	3	41	41	354	102	442	69	122	519	199	734	1,149
Rural	136	2,221	592	2,361	1,444	2,498	2,692	1,024	13,949	844	18,814	8,948
Total	189	4,200	903	7,074	2,072	6,261	3,063	2,201	17,601	2,868	23,828	22,604
1980												
Urbanized Area	86	4,056	325	6,694	727	5,003	412	1,436	3,739	2,179	5,288	19,368
Urban 5,000-50,000	5	109	52	585	97	568	74	125	560	209	787	1,596
Rural	125	2,723	625	3,640	1,385	2,848	3,132	1,216	15,801	949	21,070	11,376
Total	216	6,888	1,002	10,919	2,209	8,419	3,618	2,777	20,100	3,337	27,145	32,340
1990												
Urbanized Area	86	6,731	581	10,810	927	7,175	521	1,951	4,350	2,542	6,265	29,209
Urban 5,000-50,000	5	147	61	1,046	93	691	77	148	598	215	835	2,247
Rural	125	4,211	660	4,772	1,328	3,365	3,575	1,439	17,655	1,059	23,342	13,846
Total	216	11,089	1,102	16,628	2,348	11,231	4,173	3,538	22,603	3,816	30,442	45,302
2000												
Urbanized Area	105	8,012	437	17,670	1,130	10,366	628	2,832	4,962	3,009	7,262	41,889
Urban 5,000-50,000	5	202	70	1,553	89	781	80	146	636	210	880	2,892
Rural	120	5,616	695	5,849	1,268	3,326	4,020	1,697	19,509	1,138	25,612	17,626
Total	230	13,830	1,202	25,072	2,487	14,473	4,728	4,675	25,107	4,357	33,754	62,407

A P P E N D I X III

	1970	1980	2000
URBAN			
Total Miles	5,014	6,075	8,142
Total Vehicle-Miles	13,656,000	20,964,000	44,781,000
Total Acres	38,106	48,385	65,130
Arterial/Hwy. Miles	991	1,292	1,836
Arterial/Hwy. Veh.-Mi.	10,455,000	17,015,000	38,584,000
Arterial/Hwy. Acres	8,860	13,758	19,291
Local & Collector Miles	4,023	4,783	6,306
Local & Collector Veh.-Mi.	3,201,000	3,949,000	6,197,000
Local & Collector Acres	29,246	34,627	45,845
RURAL			
Total Miles	18,814	21,070	25,612
Total Vehicle-Miles	8,948,000	11,376,000	17,626,000
Total Acres	144,250	163,415	204,330
Arterial/Hwy. Miles	2,172	2,135	2,083
Arterial/Hwy. Veh.-Mi.	7,080,000	9,211,000	14,791,000
Arterial/Hwy. Acres	22,270	25,758	29,192
Local & Collector Miles	16,641	18,935	23,529
Local & Collector Veh.-Mi.	1,868,000	2,165,000	2,835,000
Local & Collector Acres	121,980	137,657	175,138
Total Valley Miles	23,828	27,145	33,754
Total Valley Veh.-Mi.	22,604,000	32,340,000	62,407,000
Total Valley Acreage	182,400	211,800	270,800

MILES STREETS, ROADS & HIGHWAYS / VEHICLE MILES OF TRAVEL

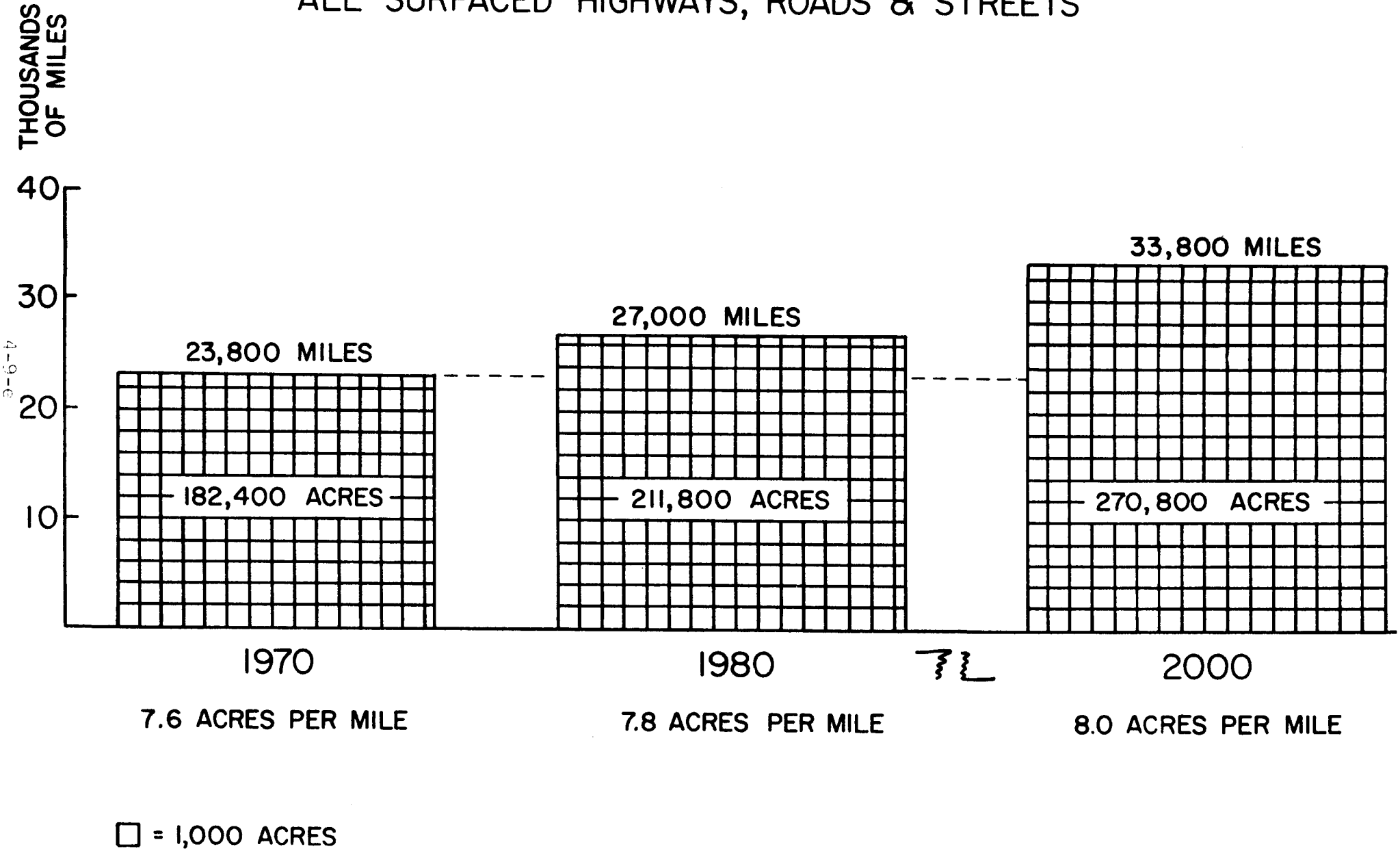
WILLAMETTE VALLEY STUDY



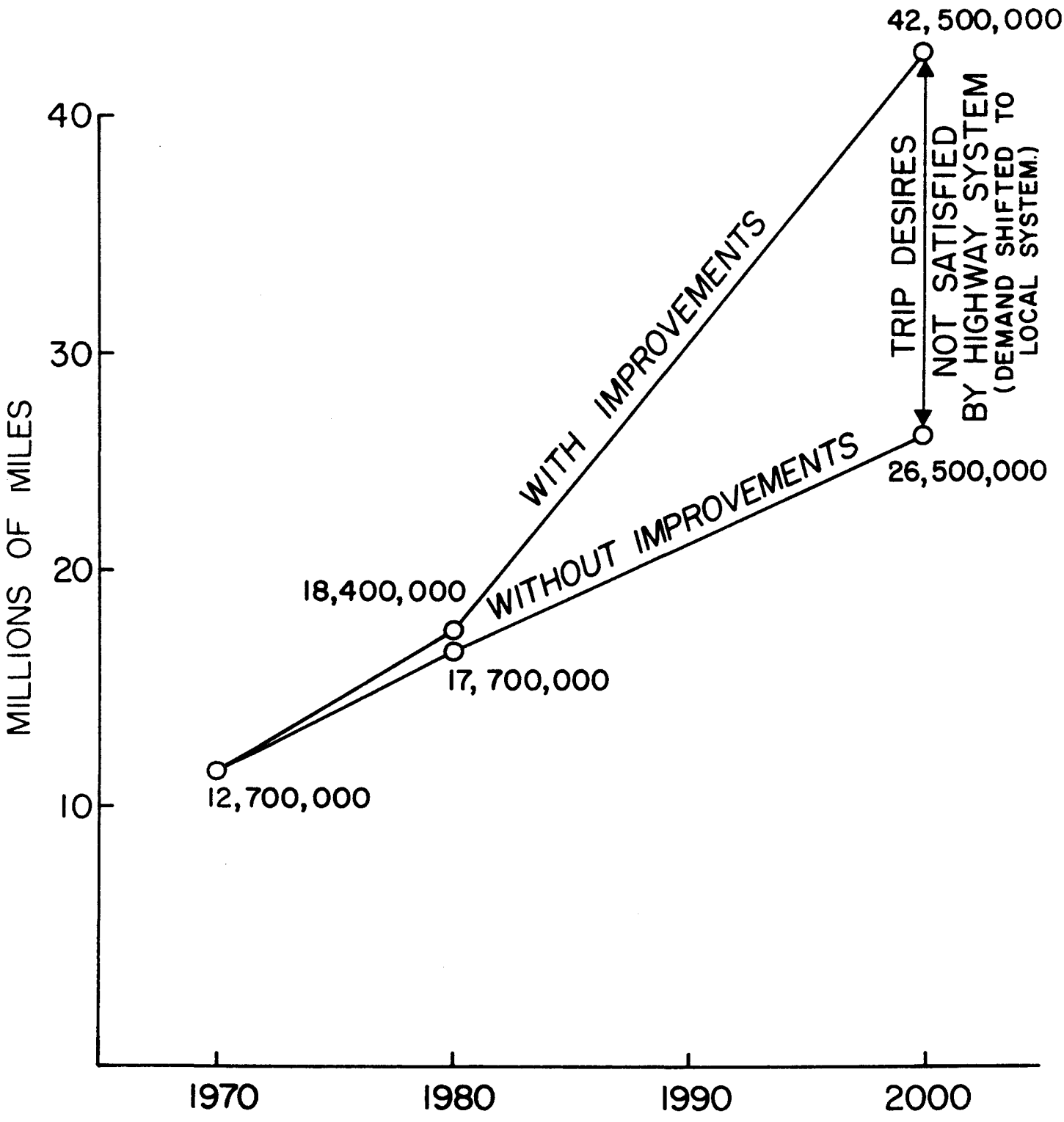
WILLAMETTE VALLEY

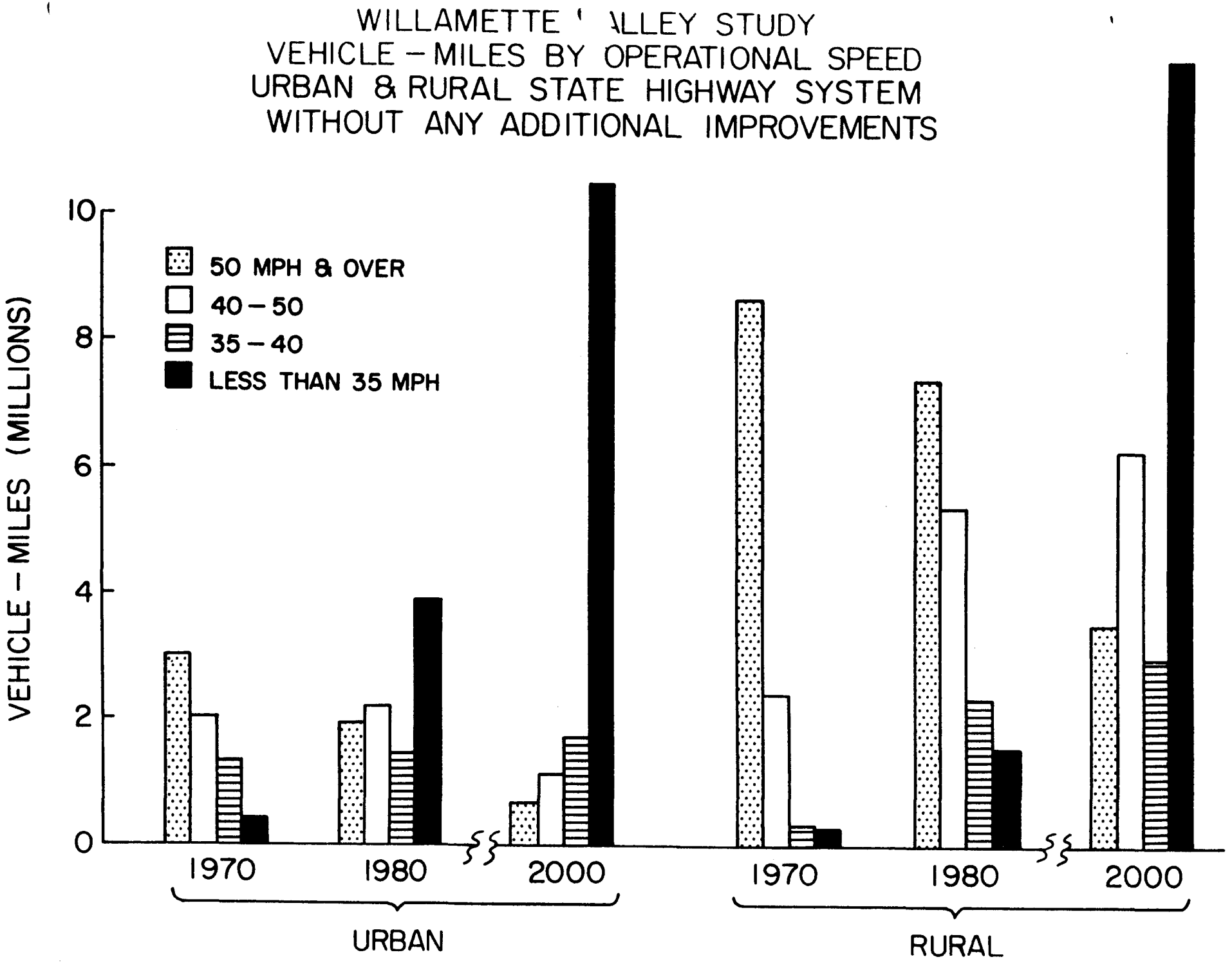
ESTIMATED MILEAGE AND ACRES OF RIGHT OF WAY

ALL SURFACED HIGHWAYS, ROADS & STREETS



DAILY VEHICLE-MILES OF TRAVEL ON STATE HIGHWAY SYSTEM IN WILLAMETTE VALLEY




WILLAMETTE VALLEY STUDY
VEHICLE – MILES BY OPERATIONAL SPEED
URBAN & RURAL STATE HIGHWAY SYSTEM
WITHOUT ANY ADDITIONAL IMPROVEMENTS
VEHICLE – MILES (MILLIONS)
0
2
4
6
8
10
50 MPH & OVER
40 – 50
35 – 40
LESS THAN 35 MPH
1970
1980
2000
URBAN
1970
1980
2000
RURAL

IV. MARITIME FACILITIES

A. Present

Portland's maritime facilities provide the basic water access for serving the Willamette Valley's export and import needs. The Port of Portland's general cargo facilities (excludes bulks such as wheat, oil, etc.) at terminals 1 and 2, and bulk, auto, steel, and general cargo berths at terminal 4,form the backbone of this water transportation system. Presently, there are 21 berths at these three terminals and nearly 1.4 million square feet of warehouse space and 2 million square feet of open storage space.

About 619,000 tons of general cargo moved across Portland's docks in 1960 and 923,000 in 1970. Based upon a preliminary sample, in excess of 90% of the outbound general cargo originated in the Valley and 70% of the inbound cargo is destined for Valley points. Other major origins and destinations served include: northwest Oregon, southwest Washington, and the Columbia River Basin. Imports run from construction steel to electrical appliances. Exports include large quantities of agricultural and timber products as well as processed goods. The major mode of transportation to and from the dock facilities for general cargo is truck.

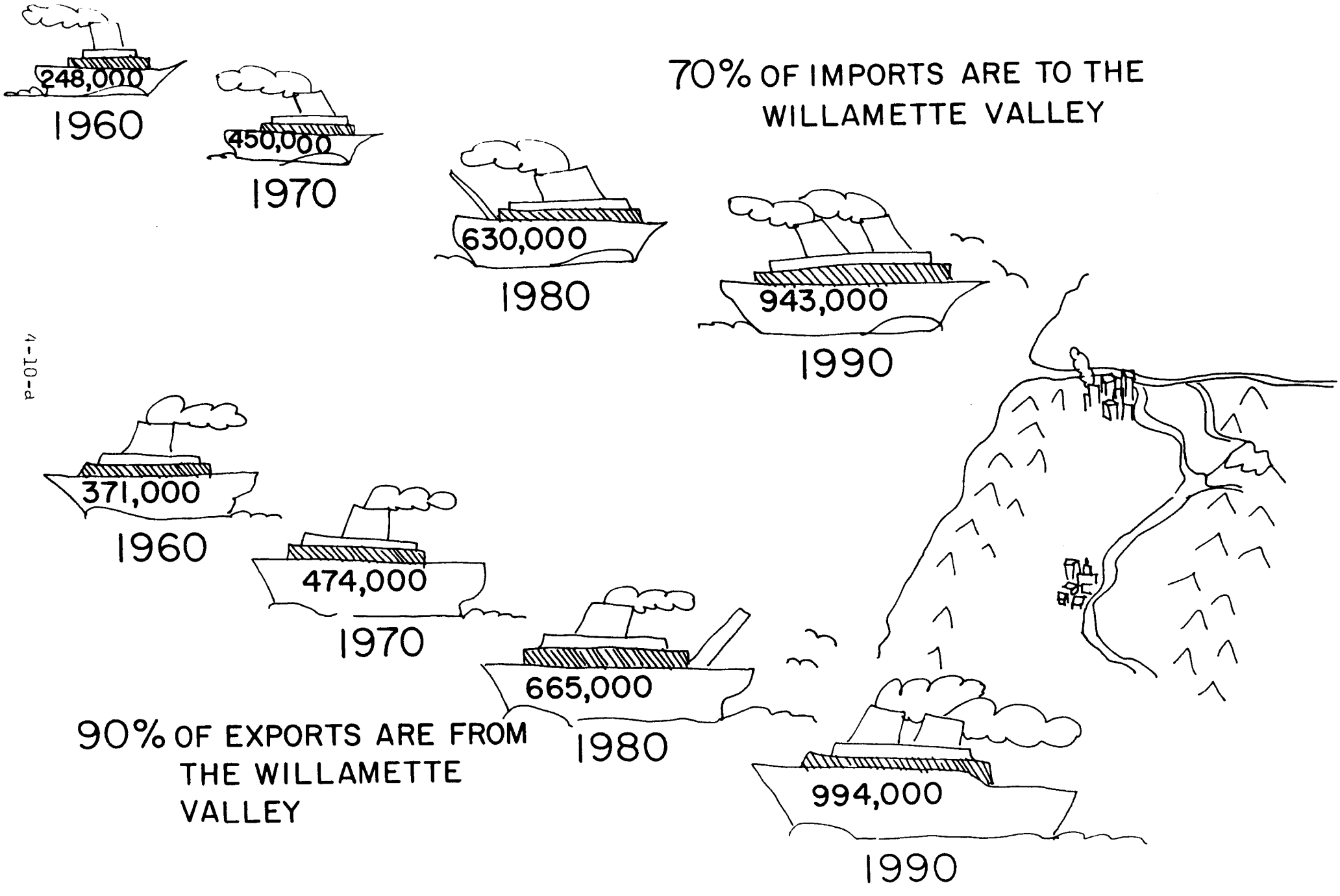
B. Projections

If the exporting and importing of cargoes remains at the same proportion as the population, the annual general cargo tonnages will increase to 1,296,000 tons in 1980 and 1,937,000 by the year 1990. Warehouses and other storage space will have to be increased at a similar ratio to handle larger volume of cargo. Maritime cargo handling systems are changing rapidly and increased capacity to handle future cargo demand is assumed to be achieved by fewer additional berths for equivalent volumes of cargo. No projection of future facilities is available.

C. Preliminary Conclusions

It is apparent from the initial findings on the volume and the origin and destination of general cargo that the Valley's economy is greatly affected by the availability of Portland's facilities. The agriculture and forestry industries within the Valley are primary exporters of goods. The Valley industries and commercial complex is a heavy consumer of imported manufactured and semi-processed goods. Any great reversal

PORTLAND MARITIME COMMERCE IN TONS



70% OF IMPORTS ARE TO THE WILLAMETTE VALLEY

90% OF EXPORTS ARE FROM THE WILLAMETTE VALLEY

4-10-a

in the Valley's forestry or agricultural industries will have a tremendous impact on the operations of the Portland dock facilities. At the same time, any major constraints such as the closing of the Columbia River shipping channel, future lack of adequate facilities, etc., will directly impact the Valley's economic base. The highway and roadway system is critical to the marketing of the Valley's products destined for areas overseas. Rail and barge do play an important but more minor role in the collection of Valley products for overseas movements.

D. Projection Assumptions

Cargo movements were projected by gross correlations to population benchmarks (projections only indicative of cargo growth trends).

E. Sources

Port of Portland staff.

V. PUBLIC TRANSPORTATION

A. Present Status

The current service areas of the Valley's urban mass transit systems cover over 70% of the Valley's population. The four urban areas have service provided by the Tri-County Metropolitan Transportation District (Tri-Met), Lane Transit District, Salem Transit and the Corvallis bus system. These systems now operate 324 buses over 2,336 miles of routes.

Presently, there are an average of 17 rides per person per year in the area served. During the 1970-71 fiscal year, the four systems provided 18,621,000 rides. This is a substantial decline in bus riderships over the previous two decades. For example, in 1952 the Portland Traction Company carried in excess of 50,000,000 passengers. There are indications that current ridership has stabilized.

Emphasis is being placed upon re-invigorating the urban mass transit systems by large capital investments in modern equipment, coordinated highway and transit planning for bus lines, peripheral parking, downtown bus malls, more convenient scheduling and routing and other innovations.

The Valley is served by a number of bus routings between cities. In 1970 there were (when counted) 416 bus departures each work day on the Greyhound, Trailways and Hammond systems from Willamette Valley stations to another Valley distination. It is roughly estimated that approximately 3.2 million passengers were served by this intercity bus system. No estimates are available on the Valley's ridership on AMTRAK's three weekly northbound and southbound trains.

B. Projections on Current and Improved Usage Trends

Assuming the same rate of coverage (and that the urban districts can stabilize past downward trends in patronage), it has been estimated that the urban public system ridership will increase proportionately as population increases from 18.6 million rides annually in 1970 to 21 million in 1980 and 30.4 million in 2000.

Assuming that efforts to increase patronage result in a 4% increase per year, ridership would increase from 18.6 million in 1970 to 31.2 million in 1980 and 99 million in 2000.

Drastic revisions in projected ridership might be assumed if environmental, fuel (shortage) or emergency measures stimulated ridership, or if more innovative and elaborate systems were developed. According to some estimates, a "new mode system" in Portland, for example,might increase ridership an additional 110,000 rides a day or approximately a 40% increase in rides a year.

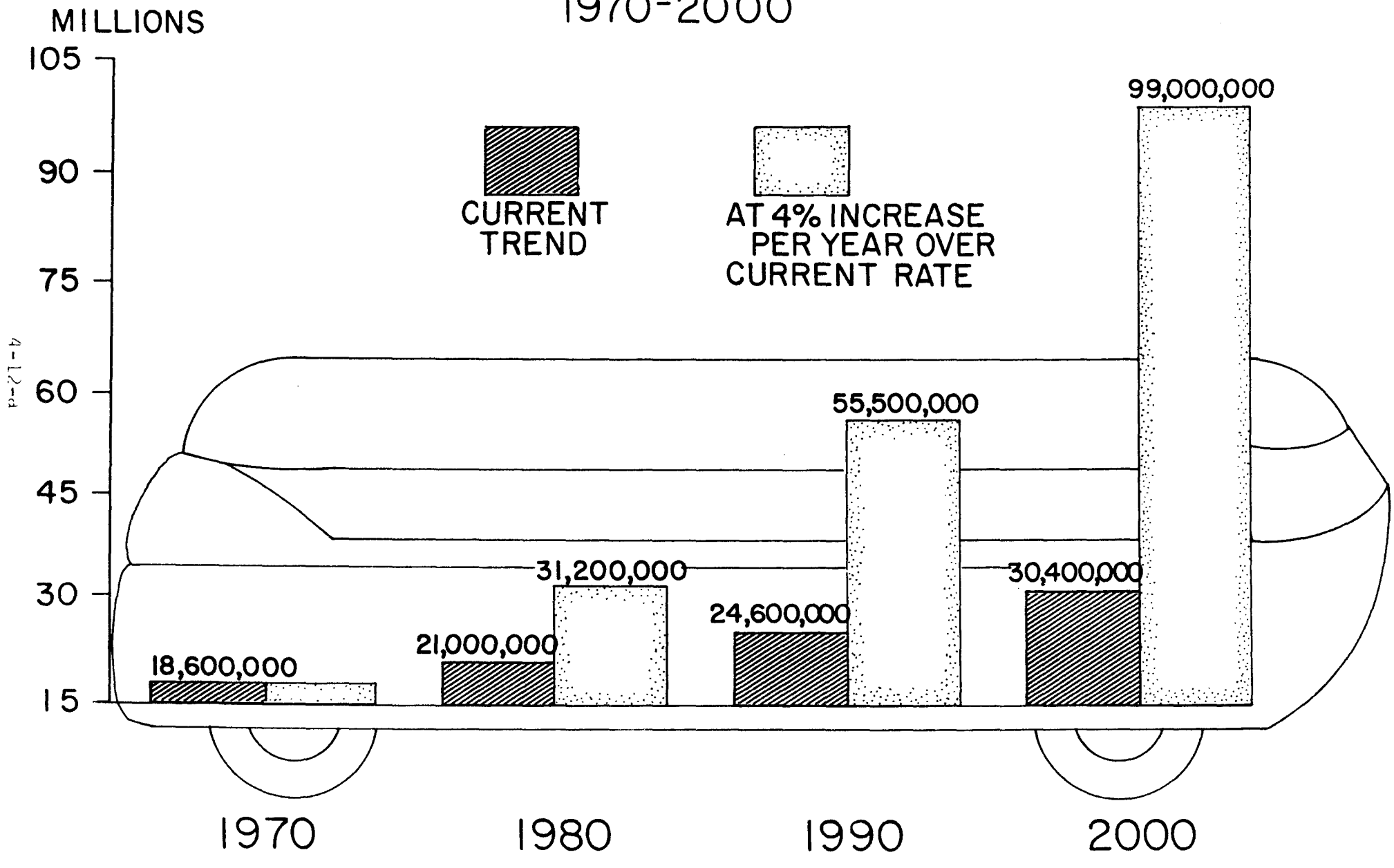
If bus traffic between cities increases at the same level as the population, the daily bus departures will increase from 416 in 1970 to 488 in 1980 and 708 in 2000. Ridership would increase from an estimated 3.2 million in 1970 to 3.8 in 1980 and 5.5 million in 2000.

C. Preliminary Conclusions

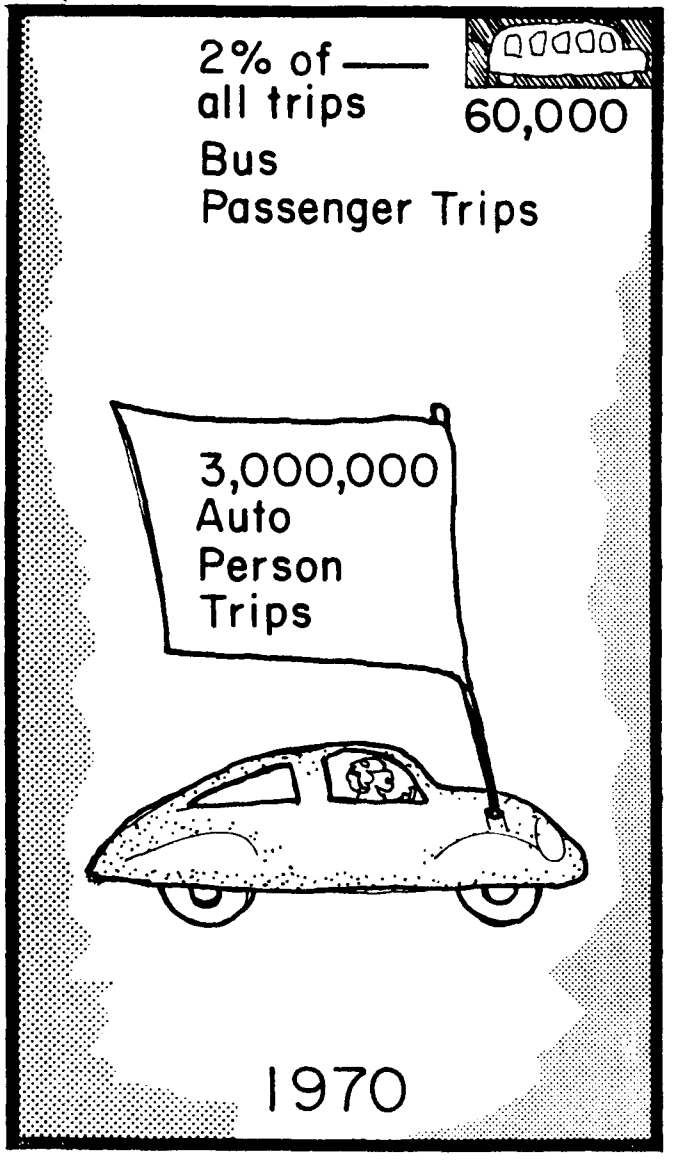
Current analysis demonstrates that the historical downward trend has been stabilized and ridership has and will be increased in some cases.

In terms of the total number of urban and intercity trips, buses presently account for only a small percentage of the total travel. For example, in the

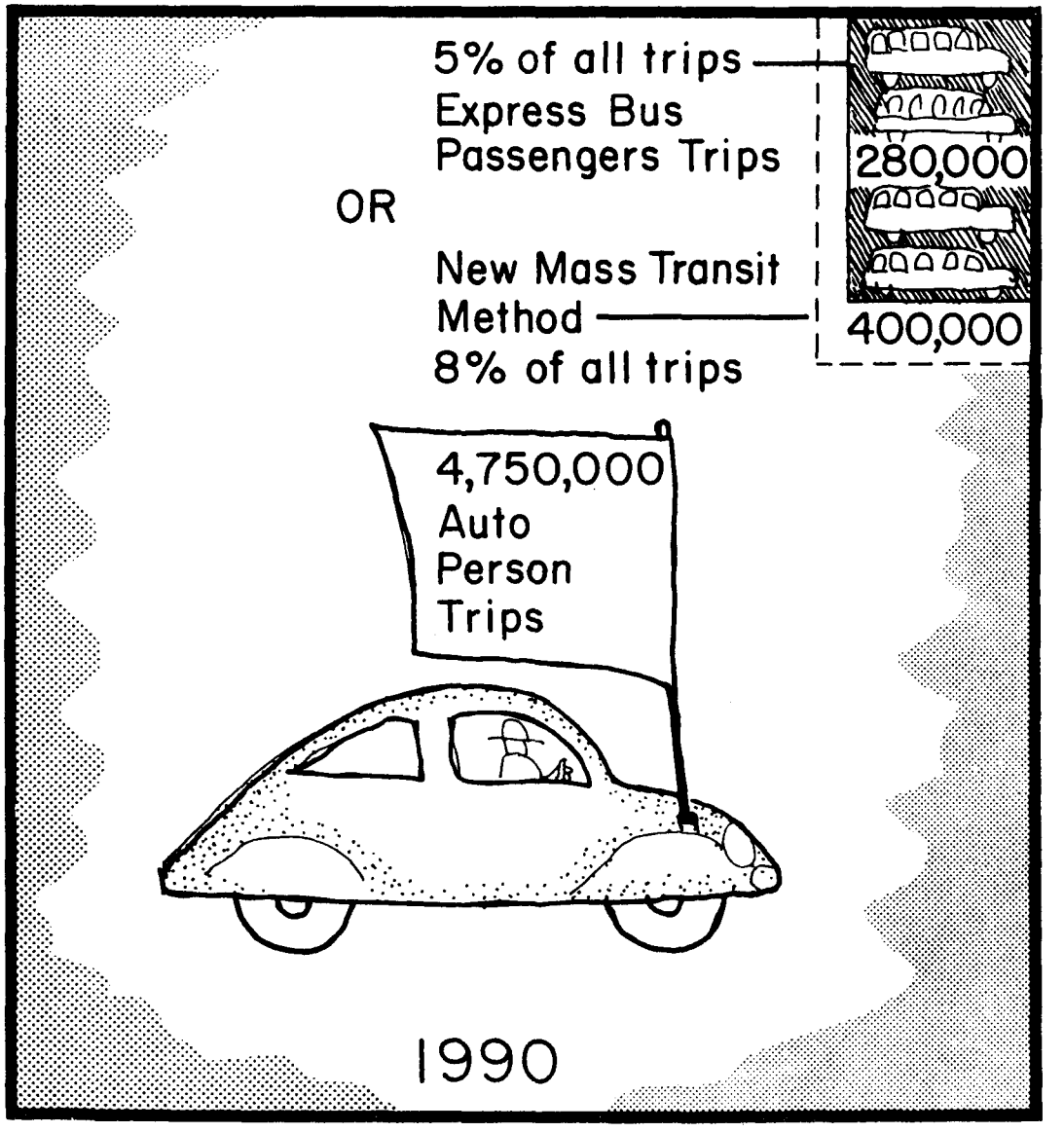
VALLEY URBANIZED AREAS
URBAN MASS TRANSIT - ANNUAL RIDERSHIP
1970-2000



PORTLAND-VANCOUVER MASS TRANSIT SERVICE AREA
1970-1990: DAILY TRIPS



3,060,000 Total Trips



5,009,000 Total Trips

4-12-b

Portland-Vancouver metropolitan area, it is estimated that there are 3 million auto person trips per day and only 60,000 bus passenger trips. If the present trend were to continue, it is estimated that buses will only serve about 5% of future urban area travel demands. It has been estimated in one study that there will be 4,750,000 daily auto person trips in the Portland metropolitan area by 1990. Using an improved express bus system, it has been projected that there will be 280,000 bus passengers per day. Using a "new mode system", mass transit would account for 400,000 passengers, or approximately 8% of the total.

D. Assumptions

1. Current bus ridership in urban areas as proportion of projected population assuming stabilization of past downward trend.

2. Growth rate of 4% yearly increase in rides per person assuming various innovations and other future increase ridership.

3. Intercity ridership roughly assumed to average 30 persons for each bus departure.

E. Sources

1. Mass Transit Division

2. Preliminary data being prepared by DeLeuw Cather & Company for Portland-Vancouver area.

3. P.U.C. operating permits.

VI. PRELIMINARY FINDINGS

The purpose of phase one was to develop a preliminary overview of the Valley in the broadest possible context including an understanding of the whole Valley-wide transportation system. The foregoing sections comprise the initial transportation element of this overview. Information is restricted to the aviation, road, street and highway, public transportation and port systems.

The following highlights some of the major, preliminary findings:

A. It appears that Willamette Valley residents will continue the present trend of making more and more trips

per person in more vehicles. Travel and the movement of goods will increase at a faster rate than the population. While population is projected at an increase of 70% from 1970 to 2000, transportation usage is projected at the following percent of increase:

General Aviation	405%	
Air Passenger	892%	
Highway	177%	
Maritime	110%	
Mass Transit	432%	(assumes 4% increase per year)

B. Improved transportation systems create the opportunity for increased travel per person. Conversely, a congested or limited system restricts mobility.

C. Road and highway transportation is the primary means of travel throughout the Valley and is projected to continue to be the primary mode of travel.

D. Even with the most improved public transit system being analyzed, transit will only account for a small percentage of the Valley's urban area surface travel.

E. Presently the urban public transit systems are highly reliant on the arterial highway network.

F. The rapid growth in aviation will continue to create pressure for additional surface access (road and/or public transit) to airports.

G. Portland's maritime facilities are very closely interrelated with the Valley's commerce and industry. Portland shares the interest in a viable forestry and agricultural products base. On the other hand, the total Valley has a very real interest in Portland facilities to market products and receive consumer and industrial goods.

H. Maritime facilities are highly reliant on the Valley's highway and street network.

I. The largest segment of Valley land being devoted to transportation is for the land access and property development local street network. In comparison to the total Valley land area little acreage is used

for airports, ports, mass transit and arterial and highway facilities.

J. However, the majority of Valley travel takes place on the arterial and highway rather than the local access and collector street network.

K. If the same development patterns continue to the year 2000, the majority of additional transportation facilities will continue to be for streets to serve local development.